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AudioCodes Series of High Definition IP Phones

HD VoIP

Administrator's Manual

400HD Series IP Phones with Microsoft® Lync™

Version 2.0.11

Lync

Microsoft Partner
Gold Communications

AudioCodes

HD VoIP Sounds Better

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Notice

This manual shows administrators how to set up and configure AudioCodes' 400HD Series IP Phones in the enterprise network environment.

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Related Documentation

Document Name
420HD IP Phone User's Manual
430HD and 440HD IP Phone User's Manual
420HD IP Phone Quick Guide
430HD IP Phone Quick Guide
440HD IP Phone Quick Guide
IP Phone Management Server Administrator's Manual
EMS and SEM Server IOM Manual
EMS User's Manual

Regulatory Information

Compliancy and Regulatory Information can be viewed at:
http://www.audiocodes.com/library.

Note: Throughout this document, where features can be configured using the Web interface or configuration file, the Web parameter is displayed in the regular font above its corresponding configuration file parameter, which is enclosed in square brackets in bold font type.

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1 Introduction

This Administrator's Manual is intended for administrators responsible for provisioning AudioCodes' 400HD Series of IP Phones deployed with Microsoft Lync in an enterprise network.

AudioCodes IP phones are based on AudioCodes' proprietary High Definition (HD) voice technology, providing clarity and a rich audio experience in Voice-over-IP (VoIP) calls.

The phones are fully-featured telephones that provide voice communication over an IP network, allowing you to place and receive phone calls, put calls on hold, transfer calls, etc.

The phones offer different automatic provisioning options.

This manual shows how to automatically provision a mass deployment of AudioCodes IP phones using DHCP.

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2 Automatic Mass Provisioning of IP Phones using DHCP

This section shows how to automatically provision a mass deployment of AudioCodes IP phones in a Microsoft Lync environment.

Note: Instead of using DHCP as the automatic provisioning method, you can alternatively use Static DNS Record or SIP SUBSCRIBE and NOTIFY messages (see Appendix A).

As DHCP clients, AudioCodes IP phones can be automatically provisioned with the following files:

- Configuration file (.cfg)
- Firmware file (.img)

These files can be placed on any of these three provisioning server types:

- HTTP/S server
- TFTP server
- FTP server

Figure 2-1 summarizes the steps required for setting up mass provisioning of IP phones in the Microsoft Lync environment.

These steps are described in detail in the following sections.

Note: Automatic mass provisioning of IP phones using the DHCP provisioning method can alternatively be performed from the AudioCodes EMS Provisioning Server in the IP Phones Management Server. For detailed information, see the *IP Phone Management Server Administrator's Manual*.

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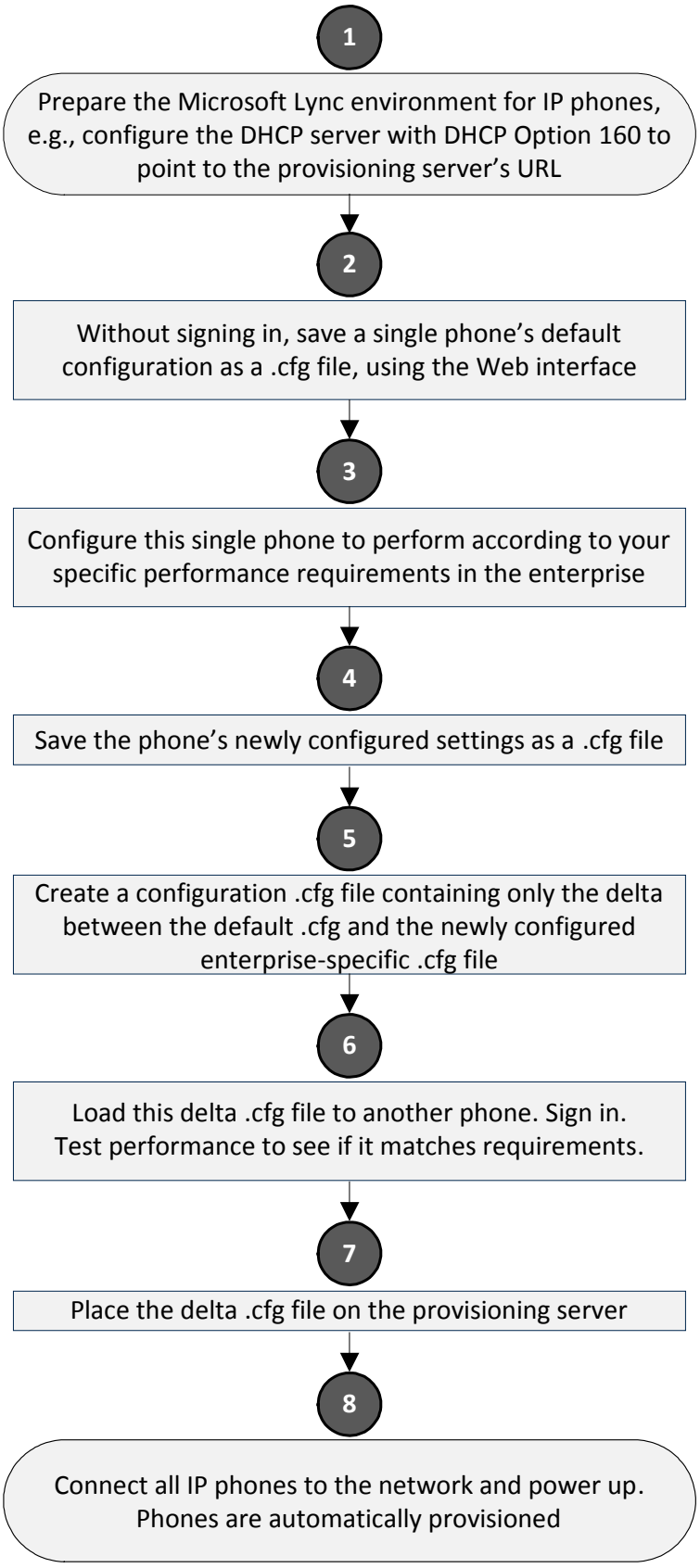
Figure 2-1: Setting up Automatic Provisioning


1
Prepare the Microsoft Lync environment for IP phones, e.g., configure the DHCP server with DHCP Option 160 to point to the provisioning server's URL
2
Without signing in, save a single phone's default configuration as a .cfg file, using the Web interface
3
Configure this single phone to perform according to your specific performance requirements in the enterprise
4
Save the phone's newly configured settings as a .cfg file
5
Create a configuration .cfg file containing only the delta between the default .cfg and the newly configured enterprise-specific .cfg file
6
Load this delta .cfg file to another phone. Sign in. Test performance to see if it matches requirements.
7
Place the delta .cfg file on the provisioning server
8
Connect all IP phones to the network and power up. Phones are automatically provisioned

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2.1 Preparing the Microsoft Lync Environment for IP Phones

Before plugging in and playing the IP phones in an enterprise's Microsoft Lync environment, make sure that the environment is ready for them.

To prepare it for IP phones, you must set up:

1. Front End Lync Server
2. Domain Controller, including:
   a. Active Directory, LDAP service
   b. DNS service
   c. DHCP service
   d. NTP service (optional)
3. Unified Messaging Server (optional)
4. Mediant™ Gateway
5. SBA Server (optional)

For details, refer to Microsoft's website at:

http://technet.microsoft.com/en-us/library/gg425854%28v=ocs.14%29.aspx

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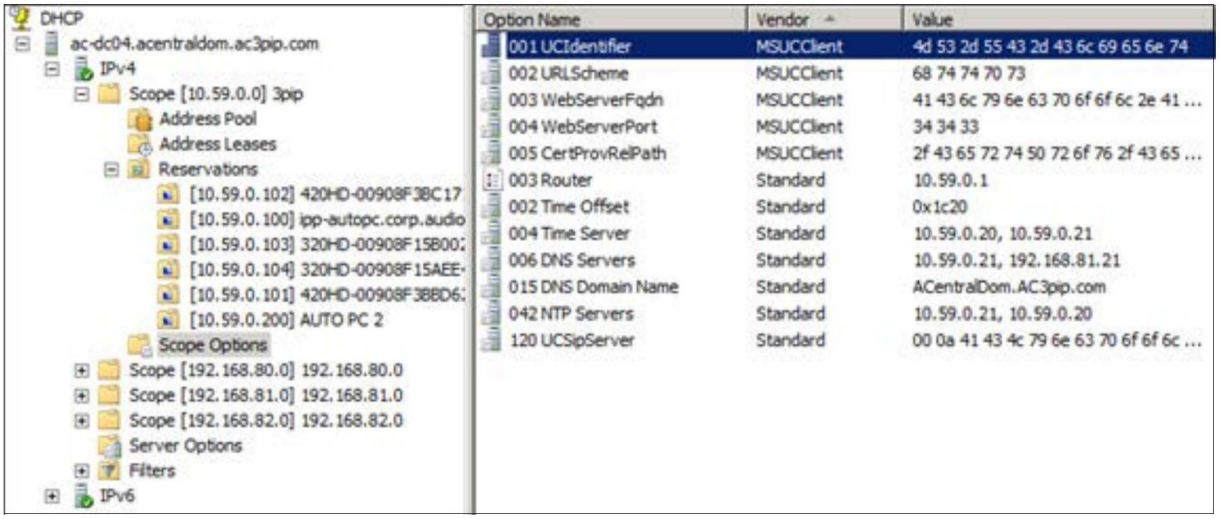
2.1.1 Making Sure DHCP Server Options are Correctly Configured

This section shows how to ensure that your enterprise's DHCP server options are correctly configured and that the network environment is ready for deployment of IP phones.

For detailed Microsoft instructions on setting up DHCP for the IP phone, see: http://technet.microsoft.com/en-us/library/gg398369(v=ocs.14).aspx

Figure 2-2: DHCP Server Options


DHCP
ac-dc04.acentraldom.ac3pip.com
IPv4
Scope [10.59.0.0] 3pip
Address Pool
Address Leases
Reservations
[10.59.0.102] 420HD-00908F3BC17
[10.59.0.100] ipp-autopc.corp.audio
[10.59.0.103] 320HD-00908F15B00
[10.59.0.104] 320HD-00908F15AEE
[10.59.0.101] 420HD-00908F3BBD6
[10.59.0.200] AUTO PC 2
Scope Options
Scope [192.168.80.0] 192.168.80.0
Scope [192.168.81.0] 192.168.81.0
Scope [192.168.82.0] 192.168.82.0
Server Options
Filters
IPv6
Option Name
Vendor
Value
001 UCIdentifier MSUCClient 4d 53 2d 55 43 2d 43 6c 69 65 6e 74
002 URLScheme MSUCClient 68 74 74 70 73
003 WebServerFqdn MSUCClient 41 43 6c 79 6e 63 70 6f 6f 6c 2e 41 ...
004 WebServerPort MSUCClient 34 34 33
005 CertProvRelPath MSUCClient 2f 43 65 72 74 50 72 6f 76 2f 43 65 ...
003 Router Standard 10.59.0.1
002 Time Offset Standard 0x1c20
004 Time Server Standard 10.59.0.20, 10.59.0.21
006 DNS Servers Standard 10.59.0.21, 192.168.81.21
015 DNS Domain Name Standard ACentralDom.AC3pip.com
042 NTP Servers Standard 10.59.0.21, 10.59.0.20
120 UCSipServer Standard 00 0a 41 43 4c 79 6e 63 70 6f 6f 6c ...

Make sure that

- DHCP Option 43 (comprising 001-005 in the figure above) is correctly configured (see Section 2.1.1.1 on page 16 below)
- DHCP Option 120 is correctly configured (see Section 2.1.1.2 on page 17 below)
- DHCP Option 42 is correctly configured (see Section 2.1.1.3 on page 17 below)

Correct configuration of these three is critically important. The other DHCP options shown in the figure above are also important but are less susceptible to inaccuracies than these.

2.1.1.1 DHCP Option 43

Option 43 comprises the five sub-options 001-005 shown in the figure above and in the table below. These point the phone to the location of the Certificate Provisioning service on the Lync server. Use the table as a reference to make sure that each sub-option is correctly configured. Sub-option 010 is *not mandatory*. It's used to specify a voice VLAN.

Refer also to http://technet.microsoft.com/en-us/library/gg398088(v=ocs.14).aspx

Table 2-1: DHCP Option 43 Configuration Reference

Sub-Option Number	Sub-Option Name	ASCII Value (example)
001	UCIdentifier	MS-UC-Client
002	URLScheme	https
003	WebServerFQDN	lyncserver.domain.com
004	WebServerPort	443
005	CertProvRelPath	/CertProv/CertProvisioningService.svc
010	VoiceVLAN	Valid values: 1-4094

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2.1.1.2 DHCP Option 120

Option 120, which includes the Lync Server's fully qualified domain name (FQDN) as shown in the table below, is required for the certification authority (CA) pool Registrar.
Use the table as reference to make sure Option 120 is correctly configured.

Table 2-2: DHCP Option 120 Configuration Reference

Option Number	Option Name	ASCII Value (example)
120	UCSipServer	lyncserver.domain.com

2.1.1.3 DHCP Option 42

Option 42 specifies the servers that provide NTP /SNTP for the network. Make sure that NTP server IP addresses are correct, as shown in the table below.

Table 2-3: DHCP Option 120 Configuration Reference

Option Number	Option Name	String (example)
42	NTP Servers	10.59.0.20, 10.59.0.21

2.1.2 Making Sure the DHCP Server is Correctly Configured for Auto Provisioning

After creating a .cfg configuration file (see Section 2.2), place it - and the software file (img) and other files such as tone files - on a provisioning server from where the IP phones can download and install it.

To get the URLs to this provisioning server, the IP phones use DHCP. The provisioning server can be HTTP/S, TFTP or FTP server.

The phone features *automatic update capability* to update the configuration and the software. Checks for newer configuration files and software versions are routinely automatically performed. Manual checks can also be performed.

➢ **To make sure the feature functions correctly:**

1. Verify that the provisioning server is running and that the configuration and firmware files are located in the correct location on it.
2. Connect the phone to the IP network and then to power.
3. On the DHCP server, configure DHCP Option 160 with the URL to the provisioning server where the configuration and firmware files are located.
   By default, the IP phone uses Option 160 which has highest priority.
   If absent, the IP phone uses Options 66/67 for TFTP.

   The following syntax is available for DHCP option 160:

   - <protocol>://<server IP address or host name>/<firmware file name>;<configuration file name>
   - <protocol>://<server IP address or host name>
   - <protocol>://<server IP address or host name>/<firmware file name>
   - <protocol>://<server IP address or host name>/;<configuration file name>

   Where <protocol> can be "ftp", "tftp", "http" or "https"
4. During DHCP negotiation, the phone requests DHCP options 66/67/160 to receive provisioning information. The DHCP server responds with Option 160 providing the provisioning URL, or Options 66 and 67 providing the TFTP IP address and firmware file name respectively.

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5. The phone then checks whether new firmware is available by checking the firmware file header. If the version is different from the one currently running on it, the phone downloads the complete image and burns it to its flash memory.
6. If new firmware is unavailable, the phone checks whether a new configuration file is available on the server. If available, the phone downloads it and updates the phone's configuration after verifying that the configuration file is related to the phone model. When a configuration update is needed, the phone might reboot.

Notes:

- Only img (firmware) and cfg (configuration) files can be used.
- In the DHCP Discover message, the phone publishes its model name in Option fields 60 and 77 (e.g., 420HD). To provide different provisioning information to different models, set up a policy in the DHCP server according to phone model name.
- If the phone is powered off during provisioning, it becomes unusable; perform a recovery process (see Section 5 on page 107).

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2.2 Creating a Configuration File for Auto Provisioning

Most phones deployed in an enterprise typically require identical configuration settings. Best practice for creating a configuration file for auto provisioning is to:

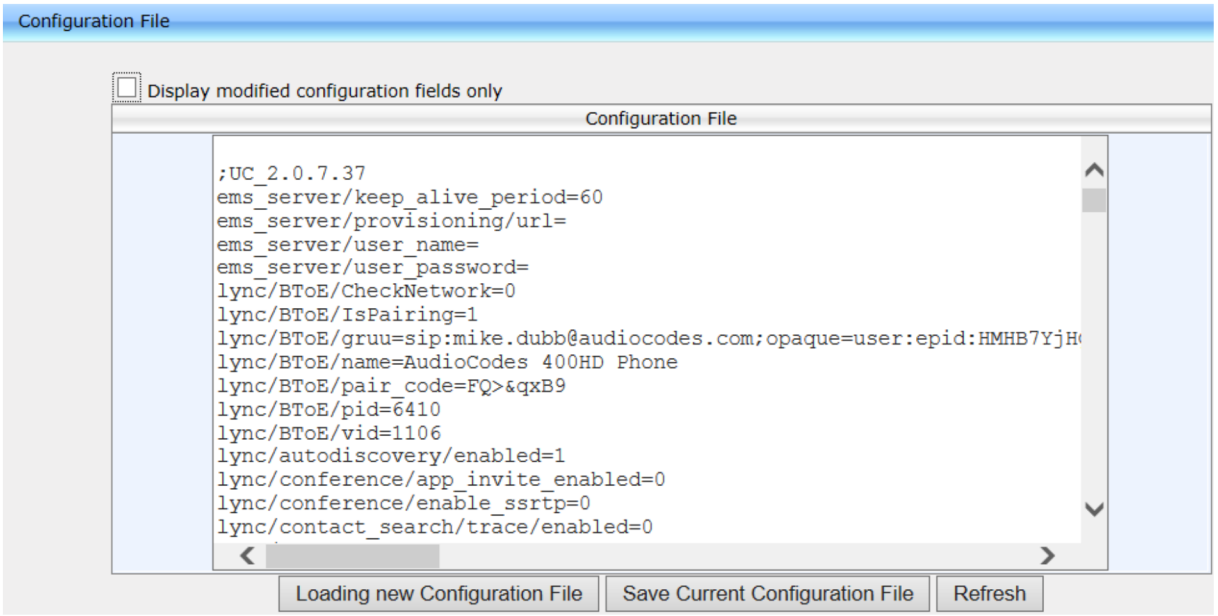
1. Without signing in, use the Web interface to save a single phone's default configuration (factory settings) as a .cfg file.
2. Configure that single phone to perform according to your specific performance requirements in the enterprise.
3. Save the phone's newly configured settings as a .cfg file.
4. Create a configuration .cfg file containing only the delta between the default .cfg and the newly configured enterprise-specific .cfg file.
5. Load this delta .cfg file to another phone, sign in, and test that phone's performance to see if it matches requirements.
6. Use this delta configuration .cfg file to automatically provision all IP phones through DHCP.

2.2.1 Saving a Single Phone's Default Configuration as a .cfg File

➢ **To save a single phone's default configuration as a .cfg file:**

1. Get the phone's IP address (MENU key > **Status** > **Network Status** > **IP Address**) and point your Web browser to it; the phone's Web interface login page opens.
2. Enter the login credentials (default user name is **admin**; get Windows credentials from IT); the Home page of the Web interface is displayed.
3. Open the Configuration File page (**Management** tab > **Manual Update** menu > **Configuration File**).

Figure 2-3: Web Interface - Configuration File



4. Click the **Save Current Configuration File** button and save the .cfg file in a folder on your PC.

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2.2.2 Configuring the Phone According to Requirements

You must configure a single phone according to your specific requirements in the enterprise.

➢ **To configure the phone according to your specific requirements in the enterprise:**

- Use Section 3 as reference.

2.2.3 Save the Phone's Newly Configured Settings as a .cfg File

After configuring a single phone according to your specific requirements, save the newly configured settings as a .cfg file.

➢ **To save the newly configured settings as a .cfg file:**

1. In the Web interface, open the Configuration File page (**Management** tab > **Manual Update** menu > **Configuration File**) (see Figure 2-3).
2. Click the **Save Current Configuration File** button and save the .cfg file in a folder on your PC.

2.2.4 Creating a Delta Configuration .cfg File

Create a configuration .cfg file containing only the delta between the default .cfg and the newly configured enterprise-specific .cfg file.

➢ **To create a configuration .cfg file of the delta:**

1. In the Web interface, open the Configuration File page (**Management** tab > **Manual Update** menu > **Configuration File**) (see Figure 2-3).
2. Select the **Display modified configuration fields only** option; only those default parameters you modified are displayed.
3. Click the **Save Current Configuration File** button and save the .cfg file in a folder on your PC.

2.2.5 Loading the Delta .cfg File to Another Phone, Signing In, Testing

You must load the delta .cfg file you created in the previous section to another phone, sign in, and test that phone's performance to see if it matches requirements.

2.2.5.1 Loading the Delta .cfg File to Another Phone

➢ **To load the delta .cfg file to another phone:**

1. Get the phone's IP address (MENU key > **Status** > **Network Status > IP Address**) and point your Web browser to it; the phone's Web interface login page opens.
2. Enter the login credentials (default user name is **admin**; get Windows credentials from IT); the Home page of the Web interface is displayed.
3. Open the Configuration File page (**Management** tab > **Manual Update** menu > **Configuration File**) and click the **Loading new Configuration File** button.; the following screen opens:

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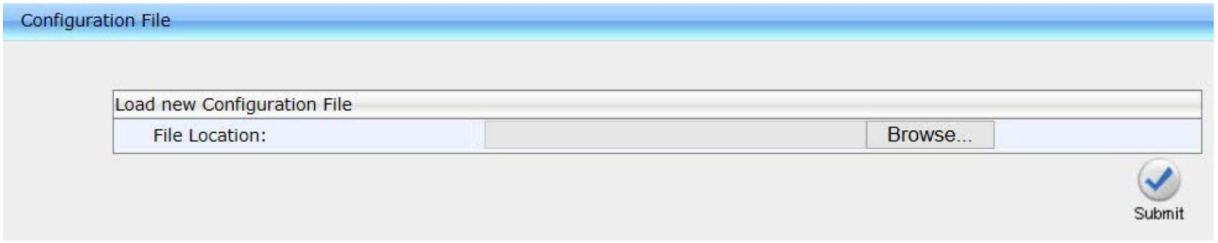
Figure 2-4: Web Interface – Loading a New Configuration File



4. Navigate to the folder in which you stored the delta configuration .cfg file, select it, and then click **Submit**; the configuration file is loaded to the phone.

2.2.5.2 Signing In to the Phone

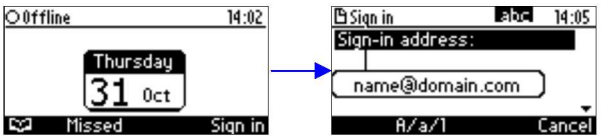
This section shows how to sign in to the IP phone for Lync. The LCD screens shown here are of the 430HD and 440HD model. The 420HD model's LCD screens are not significantly different. For detailed instructions on how to operate the phone, refer to the *User's Manual*.

➢ **To sign in to the phone:**

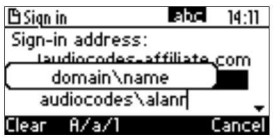
Note:

- You can sign in with your user password (default sign-in method) or with your PIN code.
- If you select the PIN code method and then sign out, PIN code will be presented the next time you sign in, in which case you can switch back to the password method if you need to.

1. In the idle LCD, press the **Sign in** softkey on the device; the LCD displays the Sign in screen:



2. Enter your SIP URI. To switch from lower case alphabetical letters to numbers and symbols, see the *User's Manual*.
3. Navigate down to the User name screen and enter your domain name, backslash, and User Name:



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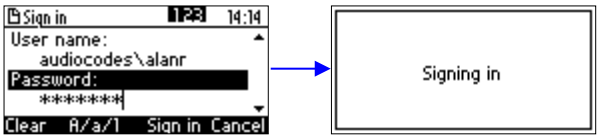
4. Navigate down to the Password screen:

5. Enter your Password (the same password you use to access your PC). To switch from lower case alphabetical letters to numbers and symbols, see the *User's Manual*. Press the **Sign in** softkey that's displayed.



You're now signed in.

2.2.5.3 Testing the Phone

You must test the phone to see if the newly configured settings match your requirements. See the *User's Manual* for information on how to operate the phone's functions and features.

2.2.5.4 Changing the Order of the Sign-In Method

Most enterprises prefer the 'PIN code' option to precede the 'Phone number' option as the default method for signing in. In the default order, 'Phone number' precedes 'PIN code', but administrators can change it.

➢ **To change the default method for signing in:**

- In the Configuration File (**Management** tab > **Configuration File**), change the 'lync/sign_in/method' parameter value to **NUMBER_AND_PIN**.

2.3 Copying the Configuration File to the Provisioning Server

After creating the delta configuration .cfg file as shown in the previous section, copy the file to the provisioning server (e.g., TFTP server) from which the phones download it when they're connected and powered up.

Make sure DHCP Option (e.g., Option 160) on your DHCP server is configured with the correct URL pointing to the provisioning server's directory.

2.4 Triggering Automatic Provisioning

When you connect the IP phones to the network and power them up, the phones' automatic provisioning is triggered. The phones automatically send out a DHCP Discovery request and then receive IP address information (e.g., TFTP server's address) in the DHCP Options sent by the DHCP server. The phones then contact the provisioning server for downloading the required files (e.g., .cfg file and firmware .img file).

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2.5 Troubleshooting Automatic Provisioning

2.5.1 Using the Phone LCD

Use the table below to help troubleshoot deployment problems that can occur after preparing the enterprise network environment for IP phone deployment.

Tip: Use the *first phone* that you deploy as an *indicator* for the entire deployment. If the first phone plugs in and plays without irregularities, all phones deployed after it should also. If it doesn't, troubleshoot as shown in this section before proceeding to deploy the other phones.

Note: After preparing the network and verifying readiness, make sure that the Lync PC client is operating, i.e., that the Lync server-client (Front End) setup is correct. Only after this, deploy the first phone.

Table 2-4: Troubleshooting Deployment Problems

Problem / LCD Notification	Corrective Action
Certificate problem LCD Notification: "Failed to validate certificate" -or- "Failed to obtain user certificate"	Three possible actions: ▪ Make sure that DHCP Option 43, sub-option 5, was enabled in the DHCP server. If it wasn't, enable it. ▪ Make sure you can access the Lync Web service URL: ▪ https://lyncsvrWebPoolFQDN:443/CertProv/CertProvisioningService.svc ▪ Query the LDAP server: _ldap._tcp.<DOMAIN name> Make sure it was enabled. If it wasn't, enable it in order to get the root certificate.
Synchronization problem. LCD Notification: "Failed to connect to time server" -or- "PIN internal error"	▪ Make sure that *at least one* of the following was configured to enable synchronization: ✓ NTP server, via DNS SRV record (_ntp._udp.<SIP domain>pointing to NTP server) ✓ NTP server, returned via DHCP Option 42 ✓ Time.windows.com ✓ Time.nist.gov ✓ Configuration Parameter (manually)
Phone not initializing	Make sure that DHCP is enabled.
Cannot find SIP server for 'Domain name'. Phone can't perform registration. LCD Notification: "Failed to connect <domain> server" -or- "Cannot find Lync server at <>"	▪ Make sure that *at least one* of the following is enabled in the DNS server: ▪ _sipinternaltls._tcp.<domain> (for TLS) ▪ DHCP results (Option 120) (for TLS) ▪ _sipinternal._tcp.<Domain> (for TCP) ▪ DHCP results (Option 120) (for TCP) ▪ _sip._tls.<Domain> (for TLS)

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Problem / LCD Notification	Corrective Action
	▪ _sip._tcp.<Domain> (for TCP)
LCD Notification: "Location look-up failed. Please enter your address."	▪ Make sure that 'Location look up' is configured by the management shell in the Lync server.
LCD Notification: "LAN Link failure"	The LAN link is disconnected. This is a general networking problem that's beyond the scope of this document. Either there's a physical cabling issue or there's a local or VLAN communications problem.
LCD Notification: "Duplicate IP"	This is a general networking problem. The IP address configured for this endpoint was already configured for another. ▪ In the DHCP server, delete the duplicate IP address and request another.
LCD Notification: "Failed to connect to Lync server"	This is a general networking problem beyond the scope of this document. If a communications problem occurs in the enterprise network, for example, if the server goes down, this notification is displayed on the phone LCD.
LCD Notification: "PIN invalid phone info"	The phone number or extension that was entered is invalid. ▪ Make sure that the correct information was entered in the phone LCD and in the Lync server interface, and that they tally. ▪ Verify in the Lync server interface that the PIN is enabled and if it isn't, enable it.
LCD Notification: "PIN not set"	▪ Verify in the Lync server interface that a PIN was configured for this user account. ▪ If it wasn't, create a PIN for the account.
LCD Notification: "PIN expired"	▪ In the Lync server interface, renew the PIN expiration policy.
LCD Notification: "PIN account disabled"	▪ Verify in the Lync server interface that the account was enabled. If it wasn't, enable it.
LCD Notification: "PIN internal error"	▪ Test the PIN Authentication process on the Lync server: Run in the server shell the emulate cmdlet: **Test-CsPhoneBootstrap -PhoneOrExt nnnn -PIN nnnn** ▪ If the test result is 'fail', there's a configuration error on the Lync server side, hence the PIN sign-in failure on the phone side. To troubleshoot, see: http://technet.microsoft.com/en-us/library/gg412852.aspx

Note:

- The *ringer* LED remains red until the problem is corrected.
- Users cannot dial or initiate calls if an LCD notification is displayed.

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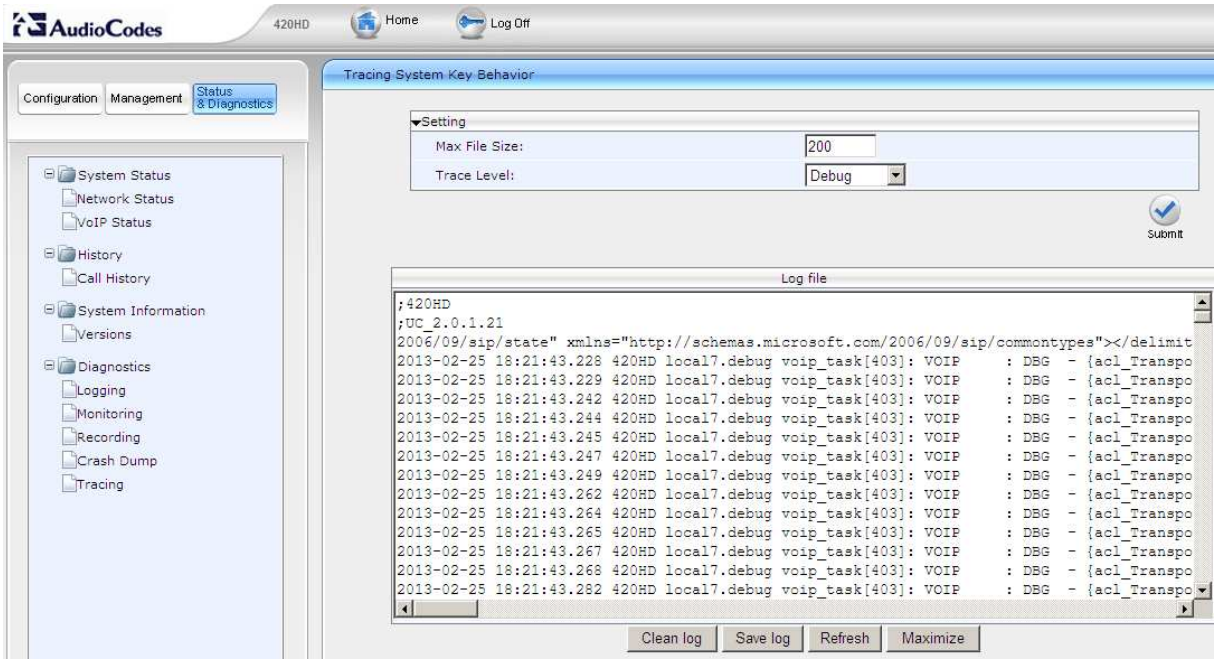
2.5.2 Using the Web Interface

This section shows how to use the Web interface to troubleshoot problems.

➢ To use the Web interface to troubleshoot:

1. Obtain the phone's IP address if the DHCP server successfully automatically provided one: Press the **MENU** key on the dial pad and in the phone's LCD, navigate to and select Status > Network Status
2. Scroll down to the IP Address and note it.
3. Open your browser and use the IP address to access the phone's Web interface.
4. Select the **Status & Diagnostics** tab > **Diagnostics** > **Tracing**:

Table 2-5: Web Interface – Status & Diagnostics - Tracing



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3 Manual Configuration of a Single IP Phone

Most phones in an enterprise typically require identical configuration settings. Best practice is therefore to manually configure a single IP phone with the settings you require, and then to use the delta configuration (the difference between the default and your configured settings) to automatically provision all phones in the enterprise via DHCP.

This section shows how to manually configure a single IP phone. After manually configuring a single IP phone, create the delta configuration file as shown in Section 2.2, and place it on the provisioning server.

3.1 Configuring Network Connections

You can configure IP network connections. For information on configuring Port Mirroring, see Section 7.6 on page 124 under 'Performing Diagnostics'.

3.1.1 Configuring LAN Connection Type

The phone's LAN Connection Type can be:

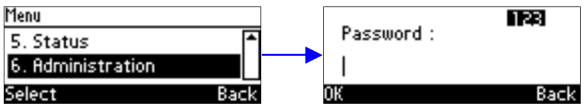
- Automatic IP (DHCP) (automatically provisioned by DHCP server from where the LAN IP address is obtained) (default)
- Static IP Address

This section shows how to change LAN Connection Type in the phone's LCD and through the Web interface.

Note: Screenshots of the 420HD LCD are shown in this section. The 430HD and 440HD LCD does not *significantly* differ. Screenshots of the three models are used interchangeably in this document unless explicitly stated.

➢ To change LAN Connection Type in the phone's LCD:

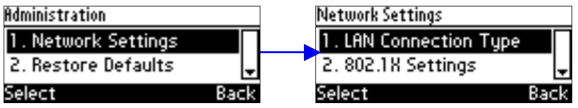
1. When the phone's LCD is in idle display, press the **MENU** key; the Menu list is displayed. Navigate down to the **Administration** option and press the **Select** softkey.



Note:

- The default password is **1234**.
- To change the default password, use the phone's Web interface or Configuration File.

2. Open the Network Settings screen (**MENU** key > **Administration** > **Network Settings**):



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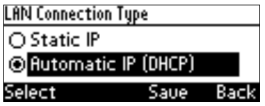
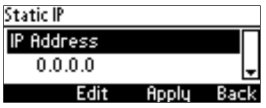
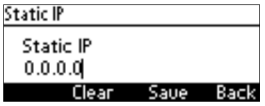
3. Select **LAN Connection Type**:



4. Navigate to **Static IP**.
5. Define a static IP addressing scheme:
   a. Press the **Edit** softkey:



   b. Press the **Edit** softkey:

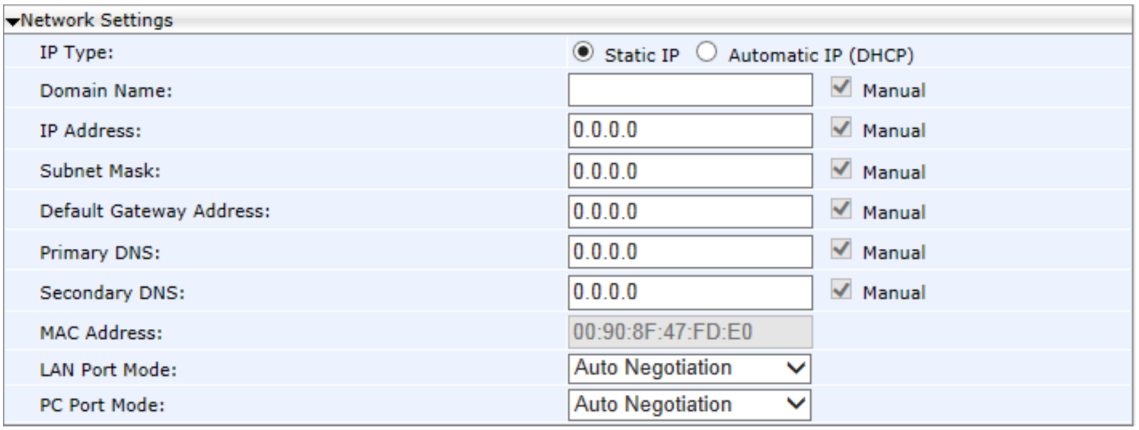


   c. Enter the new address in dotted-decimal notation, using the following keys:
      - **Navigation control**: moves the cursor left or right in the IP address
      - **Clear** softkey: deletes the digit to the left of the cursor.
   d. Press the **Save** and then **Apply** softkey.
6. Navigate to and configure **Netmask**, **Gateway**, **Primary DNS** and **Secondary DNS** as you did **IP Address**.

➢ To change LAN Connection Type in the Web interface:

1. Open the Network Settings page (**Configuration** tab > **Network Connections** menu > **Network Settings**) and select the **Static IP** option:

Figure 3-1: Web Interface - Network Settings – Static IP



2. Configure the parameters using the table below as reference and click **Submit**.

➢ To change the LAN Connection Type using the Configuration File:

1. Open the Configuration File page in the Web interface (**Management** tab > **Manual Update** > **Configuration File**).
2. Configure the parameters using the table below as reference.

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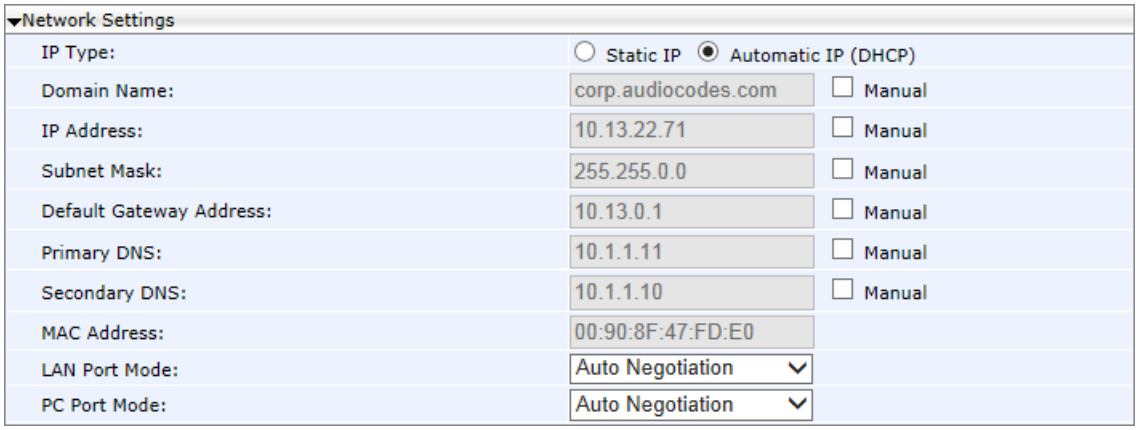
Table 3-1: Network Settings – Static IP

Parameter	Description
Note: To add a value to these parameters, enter **network/** followed by the parameter name, equal sign and then the value (e.g. `network/lan_type`=DHCP).	
IP Type **[network/lan_type]**	Defines the IP addressing method: ▪ **[STATIC]** Static IP - IP address defined manually ▪ **[DHCP]** Automatic IP DHCP (default) - IP address is acquired automatically from a DHCP server
IP Address **[network/lan/fixed_ip/ip_address]**	The LAN IP address
Subnet Mask **[network/lan/fixed_ip/netmask]**	The subnet mask address
Default Gateway Address **[network/lan/fixed_ip/gateway]**	The IP address of the default gateway.
Domain Name **[network/lan/fixed_ip/domain_name]**	The domain name.
Domain Name Server (DNS)	
Primary DNS **[network/lan/fixed_ip/primary_dns]**	The primary DNS server address.
Secondary DNS **[network/lan/fixed_ip/secondary_dns]**	The secondary DNS server address. The phone connects to this server if the primary DNS server is unavailable.

- Select the **Automatic IP (DHCP)** option:

Figure 3-2: Web Interface - Network Settings - Automatic IP (DHCP)



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The following parameters can be configured:

Table 3-2: Network Settings - Automatic IP (DHCP)

Parameter	Description
IP Type **[network/lan_type]**	Defines the IP addressing method: ▪ **[STATIC]** Static IP - Phone's IP address is defined manually ▪ **[DHCP]** Automatic IP DHCP (default) - Phone's IP address is acquired automatically from a DHCP server
Domain Name - Manual **[network/lan/dhcp/domain_name/enabled]**	Enables setting the domain name manually. ▪ **[0]** Disable (default) ▪ **[1]** Enable **Note:** If enabled, **network/lan/fixed_ip/domain_name** must also be set.
IP Address - Manual **[network/lan/dhcp/ip_address/enabled]**	Enables setting the IP address manually. ▪ **[0]** Disable (default) ▪ **[1]** Enable **Note:** If enabled, **network/lan/fixed_ip/ip_address** must be set.
Subnet Mask - Manual **[network/lan/dhcp/netmask/enabled]**	Enables setting the network mask manually. ▪ **[0]** Disable (default) ▪ **[1]** Enable **Note:** If enabled, **network/lan/fixed_ip/netmask** must be set.
Default Gateway Address – Manual **[network/lan/dhcp/gateway/enabled]**	Enables setting the default gateway manually. ▪ **[0]** Disable (default) ▪ **[1]** Enable **Note:** If enabled, **network/lan/fixed_ip/gateway** must be set.
Primary DNS - Manual **[network/lan/dhcp/primary_dns/enabled]**	Enables setting the primary DNS manually. ▪ **[0]** Disable (default) ▪ **[1]** Enable **Note:** If enabled, **network/lan/fixed_ip/primary_dns** must be set.
Secondary DNS - Manual **network/lan/dhcp/secondary_dns/enabled**	Enables setting the secondary DNS manually. ▪ **[0]** Disable (default) ▪ **[1]** Enable **Note:** If enabled, **network/lan/fixed_ip/secondary_dns** must be set.

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3.1.2 Configuring LAN Port / PC Port

Port settings can be configured using the Web interface or Configuration File.

Note: The optional values of the configuration file parameters are enclosed in square brackets while its corresponding Web interface values are written outside the square brackets, for example, [1] Enable.

➢ **To define phone port settings using the Web interface:**

1. Open the Network Settings page (**Configuration** tab > **Network Connections** > **Network Settings**):

Figure 3-3: Web Interface – LAN Port Mode / PC Port Mode

2. Configure using the table below as reference and click **Submit**.

➢ **To define phone port settings using the Configuration File:**

1. Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**)
2. Configure using the table below as reference.

Table 3-3: Port Settings

Parameter	Description
LAN Port Mode **[network/lan/port_mode]**	Sets the LAN port mode. Valid values are : [AUTOMATIC] = Auto negotiation. [FULL_10] = 10Mbps + full duplex [FULL_100] = 100Mbps + half duplex [HALF_10] = 10Mbps + full duplex [HALF_100] = 100Mbps + half duplex
PC Port Mode **[network/pc/port_mode]**	Sets the computer port mode. See valid values above.

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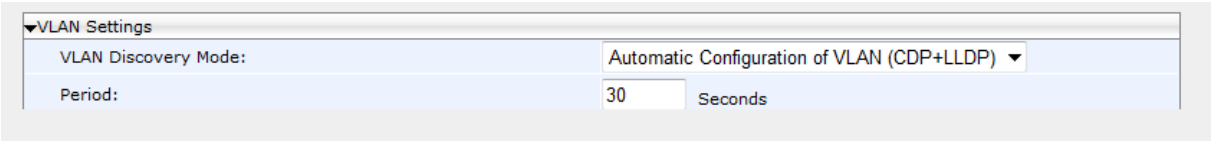
3.1.3 Configuring VLAN Settings

VLAN settings can be configured using the Web interface, Configuration File, or the phone's LCD.

➢ **To configure the phone's VLAN settings using the Web interface:**

1. Open the Network Settings page (**Configuration** tab > **Network Connections** menu > **Network Settings**).

Figure 3-4: Web Interface - VLAN Settings



2. Configure using the table below as reference and click **Submit**.

➢ **To configure the phone's VLAN settings using the Configuration File:**

1. Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**).
2. Configure using the table below as reference.

Table 3-4: VLAN Parameters Description

Parameter	Description
VLAN Discovery Mode **[network/lan/vlan/mode]**	Determines the VLAN mode of operation. ▪ [Disable] Disable ▪ **[Manual]** Manual Configuration of LAN - Static configuration of VLAN ID and priority ▪ **[CDP]** Automatic Configuration of VLAN - VLAN discovery mechanism based on Cisco Discovery Protocol (CDP) ▪ **[LLDP]** Automatic Configuration of VLAN - VLAN discovery mechanism based on LLDP. ▪ **[CDP_LLDP]** Automatic Configuration of VLAN (default) - VLAN discovery mechanism based on LLDP and Cisco Discovery Protocol (CDP). LLDP protocol is with higher priority.
Period **[network/lan/vlan/period]**	The time period in seconds between discovery messages when configured to CDP, LLDP or CDP and LLDP. The default value is 30.
VLAN ID **[network/lan/vlan/id]**	Only displayed when the 'VLAN Discovery Mode' parameter (above) is configured to **Manual**. The valid range is 0 to 4096. The default VLAN ID is 0.
VLAN Priority **[network/lan/vlan/priority]**	Only displayed when the 'VLAN Discovery Mode' parameter (above) is configured to **Manual**. Defines the priority of traffic pertaining to this VLAN. The valid range is 0 to 7 (where 7 is the highest priority). The default VLAN priority is 0.

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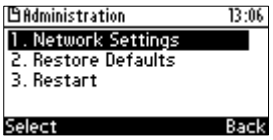
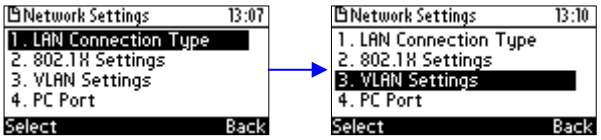
➢ To configure the phone's VLAN settings from the phone's LCD:

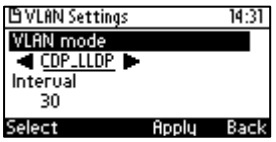
1. Press the phone's **MENU** key when the LCD is in idle display and then in the Menu screen that opens, navigate down to and select the **Administration** option.
2. Enter the same password you use to access your PC, and press the **OK** softkey; the Administration menu opens.
3. Select **Network Settings**.



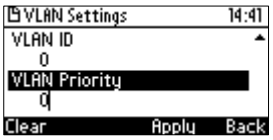
4. Navigate to and select **VLAN Settings** in the Network Settings menu.



5. For 'VLAN mode', press the navigation control's left or right rim to choose either **DISABLE**, **MANUAL**, **CDP**, **LLDP**, or **CDP_LLDP**.



6. If you choose **MANUAL**, enter 'VLAN ID' and 'VLAN Priority'.



7. If you choose **CDP**, **LLDP**, or **CDP_LLDP**, you can configure an **Interval**.

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3.2 Configuring Personal Settings

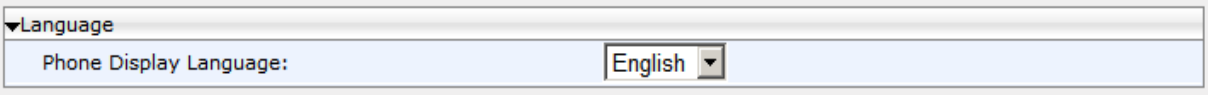
3.2.1 Configuring Language

This section describes how to configure the language displayed in the phone LCD. Language displayed can be configured using the Web interface or Configuration File.

➢ To choose a language using the Web interface:

1. Open the Language page (**Configuration** > **Personal Settings** > **Language**).

Figure 3-5: Language



2. Select the language according to the parameter in the table below, and then click **Submit**; the phone reboots and changes the LCD display language accordingly.

➢ To choose a language using the Configuration File:

- Use the table below as reference.

Table 3-5: Language Display Parameters

Parameter	Description
Phone Display Language **[personal_settings/language]**	Determines the LCD user interface language. ▪ [English] English (default) ▪ [Spanish] Spanish ▪ [Russian] Russian ▪ [Portuguese] Portuguese ▪ [German] German ▪ [Ukraine] Ukrainian ▪ [French] French ▪ [Italian] Italian ▪ [Hebrew] Hebrew ▪ [Polish] Polish ▪ [Korean] Korean ▪ [Finnish] Suomalainen ▪ [Chinese] Chinese Simplified ▪ [Chinese] Chinese Traditional ▪ [Magyar] Hungarian ▪ [Japanese] Japanese ▪ Slovak ▪ Czech
[personal_settings/lcd_contrast]	Determines the LCD contrast. Range: 0-63 (430HD / 440HD) and 0-35 (420HD). The default value depends on the hardware revision.
[personal_settings/blf_lcd_contrast]	Determines the contrast of the BLF LCD screen. Configure to a level that is comfortable for the user. Range: 100-200. Default: 140.

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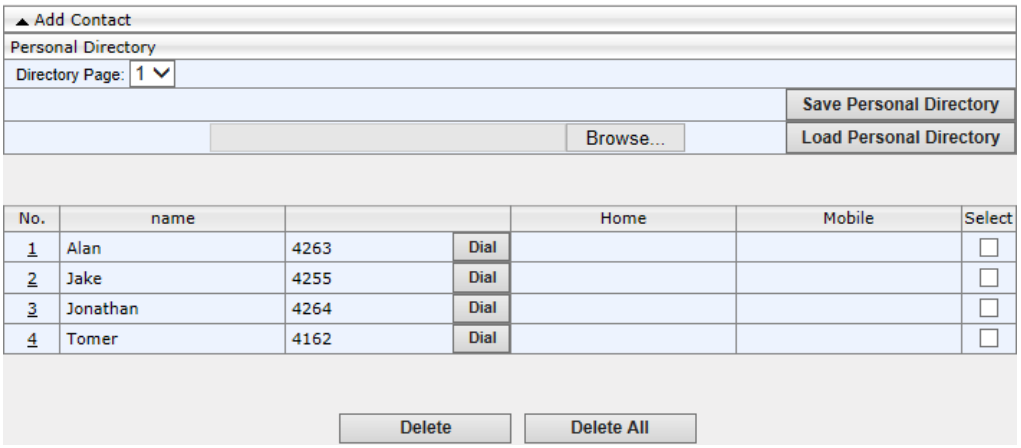
3.2.2 Configuring a Personal Directory

This section shows how to configure the Personal Directory.

➢ To configure a Personal Directory:

1. Open the Directory page (**Configuration** tab > **Personal Settings** > **Directory**).

Figure 3-6: Web Interface – Personal Directory



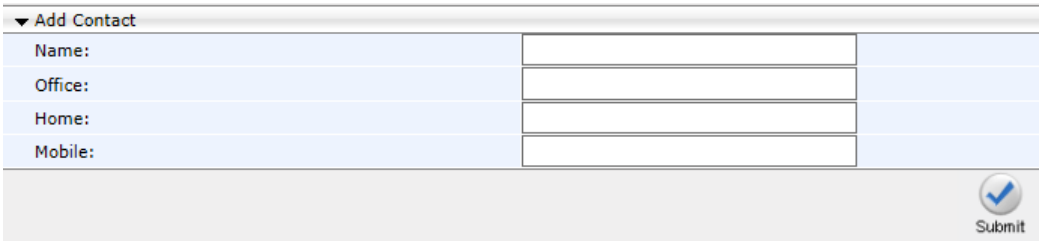
Note: The Corporate Directory is automatically managed by the Lync server.

2. Use the 'Directory Page' field to quickly navigate to a user. This is useful if the directory extends over multiple pages.
3. You can add, edit, or delete directory contacts. A contact's address can be a telephone number, IP address, or domain name. You can also download a personal directory file using the **Save Personal Directory** button or upload a personal directory file using the **Load Personal Directory** button.

➢ To add a contact to the Personal Directory using the Web interface:

1. In the Directory page, click the **Add Contact** link above the Personal Directory section; the section expands:

Figure 3-7: Web Interface – Directory – Add Contact



2. In the 'Name' field, enter the name of the contact.
3. In the 'Office', 'Home' and/or 'Mobile' fields, enter the contact's telephone numbers. The contact's number can be defined with an IP address or domain name (e.g. <number>@<IP address or domain name>).
4. Click **Submit**; the name of the contact is displayed in the Directory list of contacts.

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➢ To edit a contact:

1. If the contact does not appear in the displayed Directory list, then from the 'Directory Page' drop-down list, select the page in the directory that you want displayed.
2. In the Directory list, click the number that appears in the 'No.' column corresponding to the contact you want to edit; the contact's attributes appear in the **Edit Phone** group above.
3. Edit the contact as required, and then click **Submit**; the contact's new attributes are updated in the Directory list.

➢ To delete a contact:

1. In the Directory list, mark the 'Select' check box corresponding to the contact you want to delete.
2. Click **Delete**. (To delete all contacts, click the **Delete All** button.)

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3.2.3 Configuring Function Keys as Speed Dials

This section shows how to configure function keys as speed dials using the Web interface or the Configuration File.

On the 440HD and 430HD phones, the Function Keys are located adjacent to the BLF LCD on the right of the phone's physical interface (covered on the 430HD). In the Web interface they're labeled 1-12 and in the Configuration File 0-17.

On the 420HD, the Function Keys are the dial pad keys labeled 1-9. Long-pressing a dial pad key activates its Speed Dial. In the Web interface, they're labeled 1-9 and in the Configuration File 0-8.

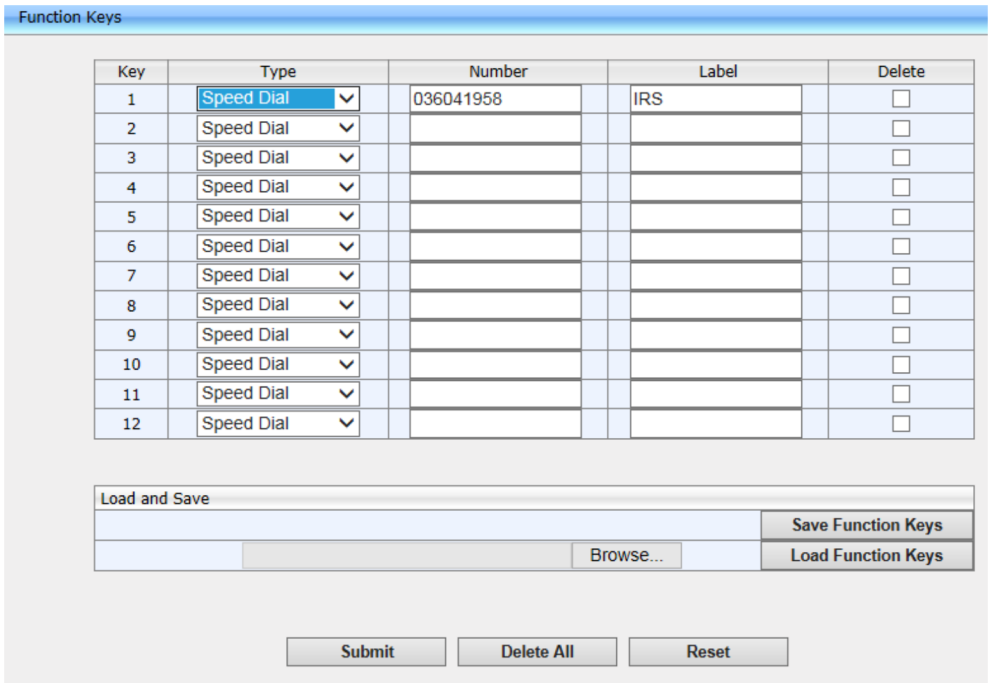
You can configure Function Keys as Speed Dials (all three phone models) or as Speed Dials + BLFs (Presence) (440HD phone only). You can use the Web interface or Configuration File to do it.

3.2.3.1 Configuring Speed Dials using the Web Interface

➢ **To configure a Function Key using the Web interface:**

1. Open the Function Keys page (**Configuration** tab > **Personal Settings** menu > **Function Keys**).

Figure 3-8: Web Interface - Function Keys



Note: The figure above shows the 430HD/440HD phone's Function Keys screen. The 420HD phone's Function Keys screen is identical, except that 1-9 keys are supported (not 1-12 as in the 430HD/440HD phone's screen).

2. In the 'Number' field corresponding to the 'Key' column, enter the telephone number to which to assign a Speed Dial.
3. Enter a 'Label' (applies only to the 440HD phone).
4. Click **Submit**.

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3.2.3.2 Configuring Speed Dials using the Configuration File

Note: The phone's speed dials can be defined in a simple text-based editor, placed on a server (e.g., HTTP or FTP/TFTP), and then uploaded to the phone using the Configuration File.

The Configuration File can include a link to a user-defined Speed Dial file, using the **provisioning/speed_dial_uri** parameter. This allows you to upload speed dial settings to the phone.

The Speed Dial file must include a list of speed dial configurations. The file must be a simple text file that can be created using an Excel document and saved as a CSV file.

The syntax of the speed dial file is as follows:

```
<memory key>,<speed dial phone number>,<type>
```

where:

- *memory key* denotes the speed dial memory key on the phone.
- *speed dial phone number* denotes the phone number that is automatically dialed, when the user presses the speed dial key.
- *type* denotes the Speed Dial feature and must be set to "0".

Below is an example of a Speed Dial file:

```
1,4418,0
2,4403,0
3,039764432,0
4,4391,0
12,1234,0
```

➢ **To configure a Function Key using the Configuration File:**

- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and configure the parameter using the table below as reference.

Table 3-6: Speed Dial Parameter

Parameter Name	Description
provisioning/speed_dial_uri	The URI for retrieving the speed dial list. The speed dial list must be included in a separate file that can be downloaded to the phone during provisioning. For example: **provisioning/speed_dial_uri=speed_dial_list.txt** **Notes:** ▪ The speed dial file is downloaded after boot up and periodically. ▪ If the speed dial file is new, the phone reboots. ▪ For creating a Speed Dial file, see Section 3.2.3.2.

3.2.3.3 Saving Configured Speed Dials in a cfg File

In the Web interface, after configuring Speed Dials you can save the configuration in a cfg file on your computer and load it to other phones.

➢ **To save Speed Dials in a cfg file:**

- In the Function Keys page (**Configuration** tab > **Personal Settings** menu > **Function Keys**), click the **Save Function Keys** button; the configuration is saved in a *.cfg* file.

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3.2.3.4 Loading the cfg File to Other Phones

After saving the configuration in a cfg file on your computer, you can load it to other phones.

➢ **To load the cfg file to another phone:**

1. In the Function Keys page of another phone's Web interface (**Configuration** tab > **Personal Settings** menu > **Function Keys**), click **Browse….**
2. In the Choose File to Upload screen that opens, navigate to and select the cfg file saved on your computer.
3. Click the **Load Function Keys** button; the file is uploaded to the phone.

3.2.3.5 Deleting a Speed Dial

➢ **To delete speed dials, either:**

- **Deleting selected speed dial entries:** select the 'Delete' check boxes corresponding to the speed dials that you want to delete and click **Submit**.
- **All speed dials:** Click **Delete All** and at the prompt click **OK**.
- **To clear (unselect) all selected 'Delete' check boxes:** click **Reset**.

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3.2.4 Programming Line Keys

Note: Applies only to the 430HD and 440HD phones.

The six programmable line keys are located adjacent to the LCD, three on each side. They're labelled 1-6 in the Web interface and 12-17 in the Configuration File. You can program them as Speed Dials or as Key Events. The speed-dial feature helps users quickly access and dial numbers that are often used or hard to remember. The key event feature helps users quickly access Dialed numbers, Missed Calls, Received Calls, Directory,DnD All and/or Forward All.

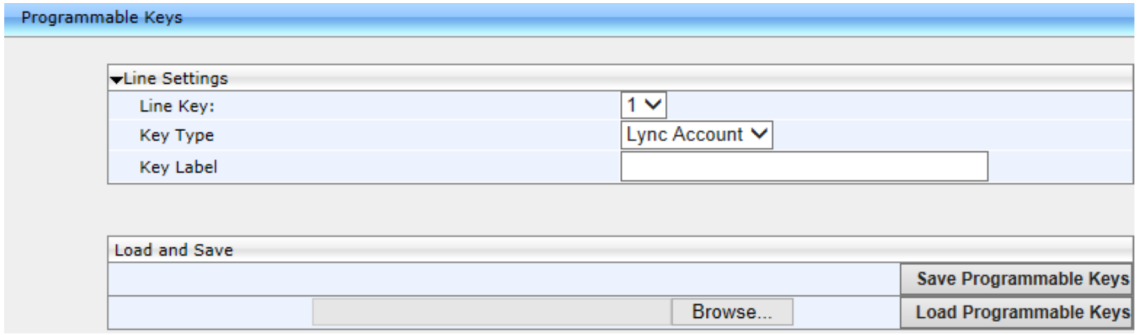
3.2.4.1 Programming Line Keys using the Web Interface

You can program the Line Keys as Speed Dials, Speed Dials+BLF, or as Event Keys. You can use the Web interface or Configuration File to do it.

➢ **To program Line Keys as Speed Dials in the Web interface:**

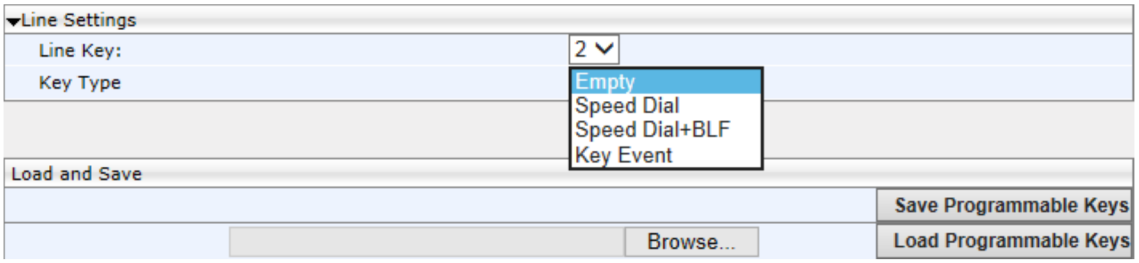
1. Open the Programmable Keys page (**Configuration** tab > **Personal Settings** menu > **Programmable Keys**).

Figure 3-9: Web Interface – Programmable Keys



Note: Line Key 1 can *only* be Key Type **Lync Account** (default) as it defines the phone line. Line Keys 2-6 can be of programmable Key Type **Speed Dial**, **Speed Dial+BLF** or **Key Event**.

Figure 3-10: Web Interface – Programmable Line Keys



2. You can program Line Keys 2-6 as Speed Dial, Speed Dial+BLF or Key Event.

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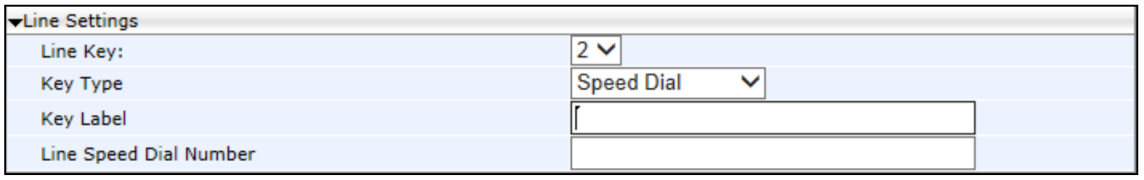
3. Select for example Key Line **2** and from the 'Key Type' field that is now programmable, select **Speed Dial**; the screen section extends to display the 'Key Label' and 'Line Speed Dial Number' fields.

Figure 3-11: Web Interface – Programmable Line Keys – Speed Dial

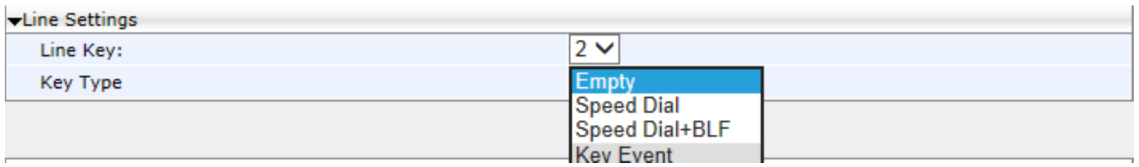


4. Choose a Label (applies only to the 440HD phone), i.e., the name of the person to whose phone number this speed dial will dial.
5. Choose the phone number of the person to whom this speed dial will dial.
6. Press the **Submit** button; the speed dial is programmed; verify that the label is now displayed in BLF LCD (440HD phone only).

➢ To Program Line keys as Event Keys in the Web interface:

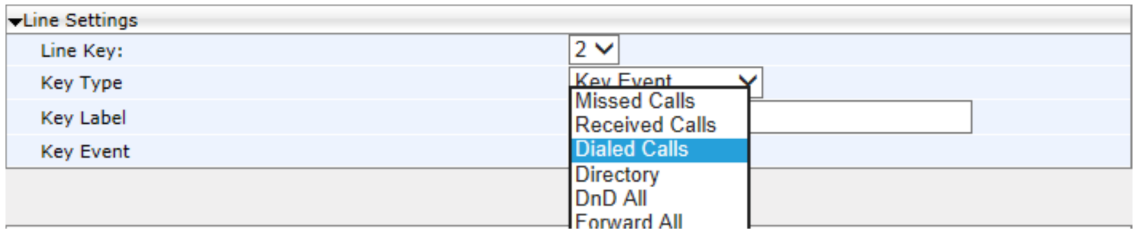
1. In the Programmable Keys page, select **2-6** in the 'Line Key' field under Line Settings.
2. In the now programmable 'Key Type' field, choose **Key Event**.

Figure 3-12: Web Interface – Programmable Line Keys – Key Event

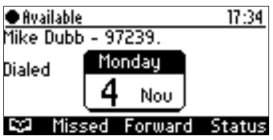


3. In the 'Key Event' field that is now displayed, choose either **Dialed Calls**, **Missed Calls**, **Received Calls**, **Directory**, **DnD All** and/or **Forward All**.

Figure 3-13: Web Interface – Programmable Line Keys – Selecting a Key Event



4. Enter a Label for the key reflecting the event, for example, enter **Dialed** in the 'Key Label' field if you're programming a Dialed Calls Key Event.
5. Press the **Submit** button; the key event is programmed; verify that the label is displayed in the phone LCD LCD adjacent to the Line Key you programmed. For example:



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3.2.4.2 Programming Line Keys using the Configuration File

This section shows how to program Line Keys using the Configuration File.

➢ To program Line Keys in the Configuration File:

- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and use the table below as reference.

Table 3-7: Programmable Line Keys Parameters

Parameter Name	Description
Line Key **[personal_settings/functional_key/12-17/shared_line_index]**	In the Web interface: Line Keys 1-6 In the Configuration File: Line Keys 12-17 In the Web interface, Line Key 1 (12 in the Configuration File) is preprogrammed as **Lync Account** (**0** in the Configuration File) (unchangeable). It defines the phone line. ▪ **[0]** Preprogrammed as Lync Account (default) (unchangeable) ▪ **[1-5]** Programmable as Speed Dial, Speed Dial+BLF (440HD phone only) or Key Event.
Key Type **[personal_settings/functional_key/12-17/type]**	For Line Keys 2-6 (12-17 in the Configuration File), choose Key Type as either: SPEED_DIAL (default) -or- SPEED_DIAL_BLF (speed dial with presence indication) -or- KEY_EVENT (see above)
Key Label **[personal_settings/functional_key/12-17/key_label]**	Program a label for the programmed Line Key, e.g., the name of the person to whose phone number the speed dial will dial. The label will appear in the BLF LCD (440HD phone only).
Line Speed Dial Number **[personal_settings/functional_key/12-17/speed_dial_number]**	Program the telephone number which the speed dial will dial.

3.2.4.3 Saving Programmed Line Keys in a cfg File

After configuring Speed Dials or Speed Dials+BLFs (presence) in the Web interface, you can save the configuration in a cfg file on your computer and load it to other phones.

➢ To save Speed Dials / Speed Dials+BLFs in a cfg file:

1. Open the Programmable Keys page (**Configuration** tab > **Personal Settings** menu > **Programmable Keys**).
2. Click **Save Programmable Keys**; the configuration is saved in a cfg file.

3.2.4.4 Loading the cfg File to Other Phones

➢ To load the cfg file to another phone:

1. In the Programmable Keys page in another phone's Web interface, click **Browse…**.
2. In the Choose File to Upload screen that opens, navigate to and select the cfg file saved previously on your computer.
3. Click the **Load Programmable Keys** button; the file is uploaded to the phone.

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3.2.5 Configuring Tones

This section shows how to configure ring tones using the Web interface or Configuration File and how to upload them to the phone.

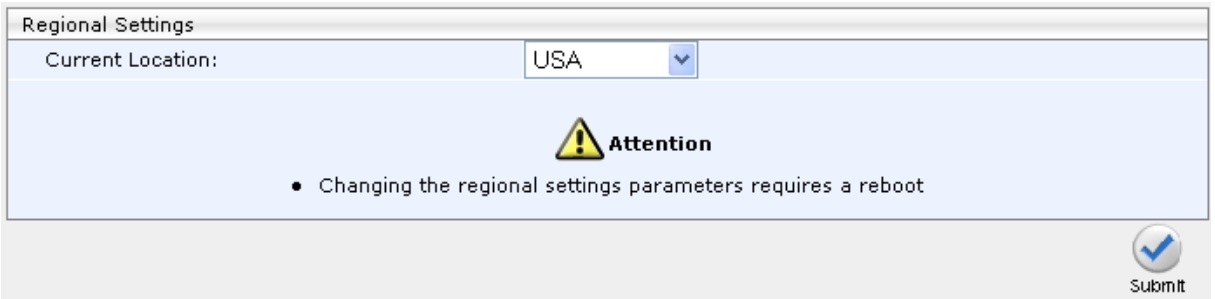
3.2.5.1 Configuring CPT Regional Settings

It's important to match your phone's Call Progress Tones (CPT) to the country in which your phone is located. This section shows how to configure it.

➢ To configure your region using the Web interface:

1. Open the Tones page (**Configuration** tab > **Personal Settings** > **Tones**).

Figure 3-14: Web Interface - Tones - Regional Settings



2. From the 'Current Location' drop-down list, select the country in which your phone is located. Use the table below as reference.
3. Click **Submit**.

➢ To configure regional location using the Configuration File:

- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and use the table below as reference.

Table 3-8: Regional Parameters

Parameter	Description
Current Location **[voip/regional_settings/selected_country]**	Defines the country in which your phone is located. The behavior and parameters of analog telephones lines vary between countries. CPTs are country-specific. The phone automatically selects the correct regional settings according to this parameter. Supported countries are: ▪ [Israel] Israel ▪ [China] China ▪ [France] France ▪ [Germany] Germany ▪ [Netherlands] Netherlands ▪ [UK] UK ▪ [Brazil] Brazil ▪ [Italy] Italy ▪ [Argentina] Argentina ▪ [Portugal] Portugal ▪ [Russia] Russia

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Parameter	Description
	▪ [Australia] Australia ▪ [USA] USA ▪ [India] India
[voip/regional_settings/use_config_file_values]	Enables the user-defined CPT. When this parameter is enabled, the 'selected_country' parameter is not relevant and the CPT values below can be determined by the user. ▪ **[0]** - Disable (default) ▪ **[1]** - Enable
Call Progress Tones (CPT) **Note:** Up to 10 CPTs can be configured (**voip/regional_settings/call_progress_tones/0…9**).	
[voip/regional_settings/call_progress_tones/%d/enabled]	Enables the specific CPT. ▪ **[0]** - Disable ▪ **[1]** - Enable
[voip/regional_settings/call_progress_tones/%d/name]	Defines the name of the CPT.
[voip/regional_settings/call_progress_tones/%d/cadence]	▪ Defines the cadence type of the tone. ▪ **[0]** - Continuous signal ▪ **[1]** - Cadence signal ▪ **[2]** - Burst signal
[voip/regional_settings/call_progress_tones/%d/frequency_a]	Defines the low frequency (in Hz) of the tone. Range: 300 - 1980 Hz, in steps of 1 Hz. Unused frequencies must be set to zero.
[voip/regional_settings/call_progress_tones/%d/frequency_b]	Defines the high frequency (in Hz) of the tone. Range: 300 - 3000 Hz, in steps of 1 Hz. Unused frequencies must be set to zero.
[voip/regional_settings/call_progress_tones/%d/frequency_a_level]	Output level of the low frequency tone (in -dBm) in Call Progress generation. Range: 0 - 63, where 63 is mute.
[voip/regional_settings/call_progress_tones/%d/frequency_b_level]	Output level of the low frequency tone (in -dBm) in Call Progress generation. Range: 0 - 63, where 63 is mute.
[voip/regional_settings/call_progress_tones/%d/tone_on_0]	tone_on_0 to tone_on_3. If the signal is Cadence or Burst, then this value represents the on duration. If a Continuous tone, then this value represents the minimum detection time. In units of 10 msec. Range: 0 - 10000.
[voip/regional_settings/call_progress_tones/%d/tone_off_0]	tone_off_0 to tone_on_3. If the signal is Cadence, then this value represents the off duration, in units of 10 msec. If not used, then set it to zero. If the signal is Burst, only tone_off 0 is relevant. It represents the off time that is required from the end of the signal to the detection time. Range: 0 - 10000.

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3.2.5.2 Uploading Ring Tones

This section shows how to upload ring tones using the Web interface or Configuration File.

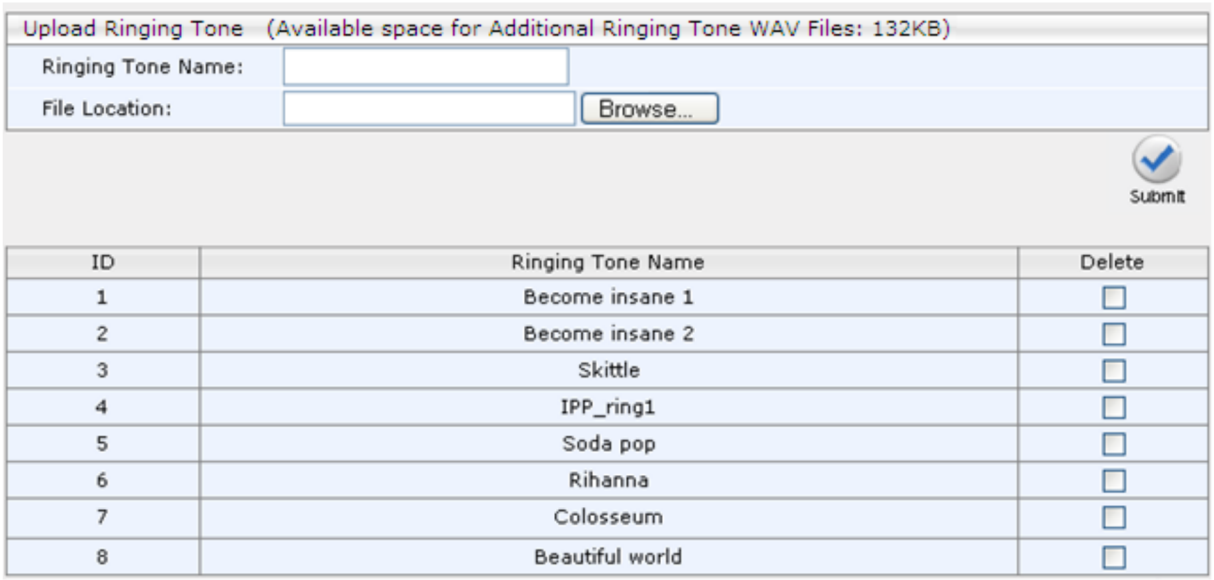
Notes:

- The ring tone file must be in WAV file format (A/Mu-Law, 8-kHz audio sample rate and 8-bit audio sample size or PMC 16-kHz audio sample rate and 16-bit audio sample size, Intel PCM encoding).
- For the phone to use an uploaded ring tone, select it in the phone's LCD (refer to the phone's *User's Manual*).

➢ To upload a ring tone using the Web interface:

1. Open the Tones page (**Configuration** tab > **Personal Settings** menu > **Tones**) and scroll down to the Upload Ringing Tone section.

Figure 3-15: Web Interface - Upload Ringing Tone



2. In the 'Ringing Tone Name' field, enter the name of the ring tone file to upload. If you do not enter a name, the phone assigns the tone's file name (without the .wav file extension) as the name of the tone.
3. Click the **Browse** button, navigate to the folder in which the ring tone file is located, select the file, and then click **Open**; the file name and path is displayed in the 'File Location' field.
4. Click **Submit**; the file is loaded to the phone and displayed in the Ringing Tone Name pane.

➢ To delete Ring Tones using the Web interface:

- Select the 'Delete' check boxes corresponding to the ring tone that you want to delete, and then click **Submit**.

➢ To upload Ring Tones using the Configuration File:

- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and use the table below as reference.

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Table 3-9: Ring Tone Parameters

Parameter	Description
Ringing Tone Name File Location **[provisioning/ring_tone_uri]**	The URI for retrieving the ring tones file. The ring tones can be compressed to zip or tgz files and provided to the phone during provisioning. For example: **provisioning/ring_tone_uri=tones.tgz** **Note:** ▪ The ringtone file is downloaded only after boot up, and not periodically. ▪ If the tones file is new, the phone updates the information, but does not reboot.

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3.3 Configuring VoIP Settings

This section shows how to configure VoIP settings. Only the settings documented in this *Administrator's Manual* are applicable.

3.3.1 Defining an Outbound Proxy

Lync Server Multitenant Hosting Pack is a Microsoft® Unified Communications (UC) hosting solution for telecommunications and hosting providers. The solution enables Microsoft hosting partners to deploy a single instance of the Lync Server software to securely and economically host multiple tenants with a rich, fully integrated UC solution.

To connect the AudioCodes Lync-compatible phone to a hosted Lync environment (LHP), a dedicated 'Outbound Proxy' parameter is available which is used to configure the hosted service provider's domain name (FQDN).

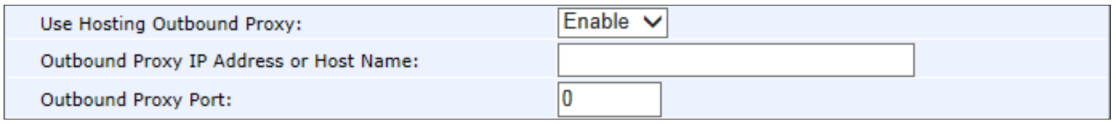
Note: In hosted environments, it's common practice that this hosted domain name is different to the enterprise's domain name.

To configure a phone for an LHP environment, configure the address of the Outbound Proxy as the hosted service provider's domain name (FQDN).

➢ To configure using the Web interface:

1. Open the Signaling Protocol page (**Configuration** tab > **Voice Over IP** menu > **Signaling Protocols**) and scroll down to the parameter under the SIP Proxy and Registrar section.

Figure 3-16: Web Interface – Signaling Protocol – Use Hosting Outbound Proxy



2. Configure the parameters using the table below as reference, and then click **Submit**.

➢ To configure using the Configuration File:

- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and use the table below as reference.

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Table 3-10: Proxy and Registrar Parameters

Parameter	Description
Use Hosting Outbound Proxy **[voip/signalling/sip/sip_outbound_proxy/enabled]**	Determines whether an outbound proxy server is used (all SIP messages are sent to this server as the first hop). ▪ **[0]** Disable (default) ▪ **[1]** Enable
Outbound Proxy IP Address or Host Name **[voip/signalling/sip/sip_outbound_proxy/addr]**	Displayed when the 'Use Hosting Outbound Proxy' parameter is enabled. Defines the IP address of the outbound proxy. If this parameter is set, all outgoing messages (including Registration messages) are sent to this Proxy according to the Stack behavior.
Outbound Proxy Port **[voip/signalling/sip/sip_outbound_proxy/port]**	Displayed when the 'Use Hosting Outbound Proxy' parameter is enabled. Defines the port on which the outbound proxy listens. Range: 1024 to 65535. Default: 5060.

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3.3.2 Configuring Dialing

This section shows how to configure Dialing parameters. Only the parameters documented in this section are applicable.

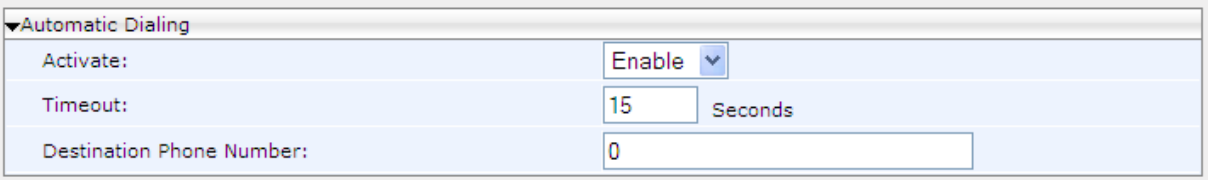
3.3.2.1 Configuring Automatic Dialing

This section shows how to configure Automatic Dialing using the Web interface or the Configuration File.

➢ To activate automatic dialing using the Web interface:

1. Open the Dialing page (**Configuration** tab > **Voice Over IP** menu > **Dialing**).

Figure 3-17: Web Interface - Dialing - Automatic Dialing



2. Configure the Automatic Dialing section parameters using the table below as reference, and then click **Submit**.

➢ To activate automatic dialing using the Configuration File:

- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and configure the parameters using the table below as reference.

Table 3-11: Automatic Dialing Parameters

Parameter	Description
Activate **[voip/dialing/auto_dialing/enabled]**	Determines whether automatic dialing is enabled (i.e., phone number is automatically dialed when you off-hook the phone). ▪ **[0]** Disable (default) ▪ **[1]** Enable
Timeout **[voip/dialing/auto_dialing/timeout]**	Only displayed if the 'Activate' parameter is configured to **Enable**. Defines the timeout (in seconds) before automatic dialing occurs after the phone is off-hooked. When set to 0, automatic dialing is performed immediately. ▪ The valid range is 0 to 120. The default value is 15.
Destination Phone Number **[voip/dialing/auto_dialing/destination]**	Only displayed if the 'Activate' parameter is configured to **Enable**. Defines a number that will be automatically dialed when the phone is off-hooked. The valid value can be up to 32 characters.

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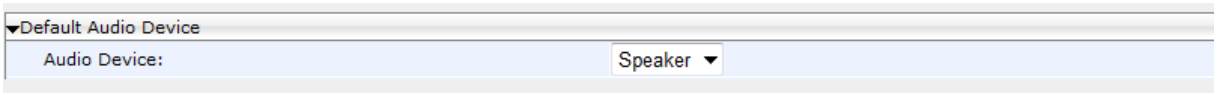
3.3.2.2 Configuring Default Audio Device

This section shows how to configure the Default Audio Device using the Web interface or Configuration File.

➢ **To configure the default Audio Device using the Web interface:**

1. Open the Dialing page (**Configuration** tab > **Voice Over IP** menu > **Dialing**) and scroll down to the Default Audio Device section.

Figure 3-18: Web Interface - Dialing - Default Audio Device



2. Configure the parameter using the table below as reference, and then click **Submit**.

➢ **To select the default Audio Device using the Configuration File:**

- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and configure the parameter using the table below as reference.

Table 3-12: Default Audio Device Parameter

Parameter	Description
Audio Device **[voip/answer_device]**	Sets the default audio device to answer or initiate a new call when no explicit audio device is set. For example: ▪ When pressing the **Answer** softkey. ▪ When initiating a call by speed dial key, call history or phone directory. ▪ Answering talk event or auto-answer. ▪ When starting to dial in “on hook” mode. Valid values are: ▪ [SPEAKER] (default) ▪ [HEADSET]
[voip/headset_only/enabled]	Lets you control use of audio device. Lets you enable headset only, and disable the phone hook and the SPEAKER button. ▪ **[0]** Headset only (default) ▪ **[1]** Disables the phone hook and the SPEAKER button. Leaves the headset as the only possible audio device that can be used.

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3.3.3 Enabling the Blind Transfer Softkey

This section shows how to enable the **BXfer** softkey on the 430HD and 440HD IP phone models using the cfg configuration file. The **BXfer** softkey provides a convenient way for users to perform Blind Transfer.

Note:

- This section applies only to the 430HD and 440HD IP phones. By default, the **BXfer** softkey is *not* displayed in the LCD when in a call on these. The default softkey on these when in a call is **Hold**.
- By default, the **BXfer** softkey *is* displayed in the LCD when in a call on the 420HD IP phone.
- The default can be changed using the cfg configuration file.

The softkey provides a convenient way for users to perform a Blind Transfer.

➢ **To change the default using the Configuration File:**

- Configure the **BXfer** softkey parameter using the table below as reference, and then click **Submit**.

Table 3-13: Blind Transfer Softkey Parameter

Parameter	Description
[voip/signalling/sip/sk_blind_transfer/enable]	Displays the **BXfer** softkey in the LCD when in a call. ▪ **[0]** Disable (default on 430HD / 440HD) ▪ **[1]** Enable (default on 420HD)

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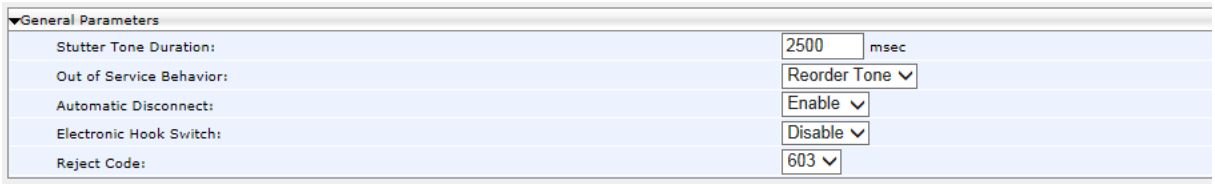
3.3.4 Enabling Electronic Hook Switch

The Electronic Hook Switch (EHS) feature can be enabled using the Web interface or Configuration File. The feature allows users to handle calls, i.e., answer calls and change volume level, with EHS-capable wireless headsets at a distance from the phone.

➢ **To enable the EHS using the Web interface:**

1. Open the Services page (**Configuration** tab > **Voice Over IP** menu > **Services**) and scroll down to the General Parameters section.

Figure 3-19: Web Interface - VoIP- Services – General Parameters



2. Configure the 'Electronic Hook Switch' parameter using the table below as reference, and then click **Submit**.

➢ **To enable EHS using the Configuration File:**

- Configure the EHS parameter using the table below as reference, and then click **Submit**.

Table 3-14: EHS Parameter

Parameter	Description
Electronic Hook Switch **[voip/services/electronic_hook_switch/enabled]**	Enables the EHS DHSG feature. ▪ **[0]** Disable (default) ▪ **[1]** Enable DHSG is the protocol that uses the special AUX port. Supporting headsets can be connected to the AUX port (in addition to the regular headset port). This allows the user to connect and disconnect calls by pressing the button on the headset.

The base unit of the headset connects to the phone's headset port, i.e., to the same port that all headsets' base units connect to. The Audio connector must be connected to the headphones port. The manangement connector must be connected to the Auxilliary port using a DHSG cable which can be ordered from AudioCodes.

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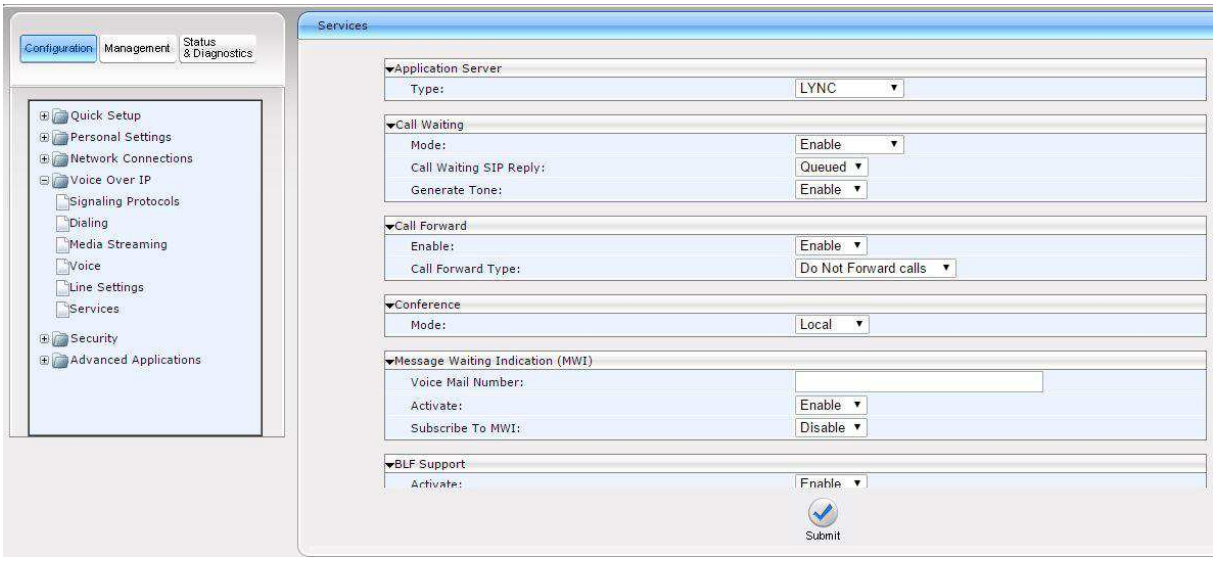
3.3.5 Disabling Audial Call Waiting Indication

This section shows how to disable the audial call waiting indication (beep progress tone) so that only visual indication for call waiting occurs. Audial call waiting indication can interfere with a conversation. This feature addresses the issue. If a user is in a call and a third party calls that user, the called user's LCD visually indicates that a calling party is waiting: the incoming call icon flashes, the adjacent Programmable Key LED flashes, and the blue Ring LED in the uppermost right corner of the device flashes (see the *User's Manual* for more information).

➢ To disable Call Waiting audial indication in the Web interface:

1. Open the Services page (**Voice over IP** > **Services**) and under the Call Waiting screen section, and from the 'Generate Tone' dropdown, select **Disable**.

Figure 3-20: Web Interface - Voice over IP – Services – Generate Tone



2. Configure the parameter using the table below as reference, and then click **Submit**.

➢ To disable Call Waiting audial indication using the Configuration File:

- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and configure the parameter using the table below as reference.

Table 3-15: Call Waiting Audial Indication Parameter

Parameter	Description
Generate Tone **[voip/services/call_waiting/generate_tone/enable]**	Enables a call waiting audial indication (beep progress tone), which can interrupt a phone conversation. ▪ **[0]** Disabled. If disabled, only visual indication for call waiting occurs. Call waiting is visually indicated in the called party's LCD. If a user is in a call and a third party calls that user, the called user's LCD visually indicates that a calling party is waiting. ▪ **[1]** Enabled (default)

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3.3.6 Configuring Disconnect if Handset On-Hooked after Putting Call on Hold

This section describes how to configure the phone so that when using the handset in a call, if the call is put on hold and the handset is then on-hooked, audio switches to the speaker and the call is *not* disconnected.

To maintain backward compatibility, users can set the ini file parameter 'voip/onhook_disconnect_when_held/enabled' to **1**. This causes the call to be *disconnected* in the above scenario, as it was in earlier versions.

➢ **To configure this using the Configuration File:**

- Use the table below as reference.

Table 3-16: Disconnect if Handset On-Hooked after Call Put on Hold

Parameter	Description
[voip/onhook_disconnect_when_held/enabled]	When using the handset in a call, if the handset is on-hooked after putting the call on hold, the call is not disconnected and the audio is switched to the speaker. To maintain backward compatibility, users can set 'voip/onhook_disconnect_when_held/enabled' to **1**. This causes the call to be disconnected in the above scenario, as it was in earlier versions. ▪ [**0**] Disable (default). When using the handset in a call, if the handset is on-hooked after putting the call on hold, the call is not disconnected and the audio is switched to the speaker. ▪ [**1**] Enable. When using the handset in a call, if the handset is on-hooked after putting the call on hold, the call is disconnected.

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3.3.7 Configuring Media Streaming

This section describes configuring the Media Streaming parameters. Only the parameters documented in this section are applicable.

3.3.7.1 Configuring Quality of Service

This section shows how to configure Quality of Service (QoS) using the Web interface or Configuration File.

➢ To configure QoS using the Web interface:

1. Open the Media Streaming page (**Configuration** tab > **Voice Over IP** menu > **Media Streaming**).

Figure 3-21: Web Interface – Media Streaming - Quality of Service Parameters

2. Configure the parameter using the table below as reference, and then click **Submit**.

➢ To configure QoS using the Configuration File:

- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and configure the parameter using the table below as reference.

Table 3-17: QoS Parameters

Parameter	Description
Type of Service (ToS) **[voip/media/media_tos]**	QoS in hexadecimal format. This is a part of the IP header that defines the type of routing service to tag outgoing voice packets originated from the phone. It informs routers that this packet must receive a specific QoS. Values can be set in decimal (e.g., 184) or hexadecimal (e.g., 0xb8). The default value is **0xb8** (184).

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3.3.7.2 Configuring Codecs

This section show how to configure codecs using the Web interface or Configuration File.

➢ To configure the codecs using the Web interface:

1. Open the Media Streaming page (**Configuration** tab > **Voice Over IP** menu > **Media Streaming**).

Figure 3-22: Web Interface – Media Streaming - Codecs

Codecs

Codec Priority	Codec Type	Packetization Time (milliseconds)
1st Codec	G.722/16000	20
2nd Codec	G.711, 64 Kbps, u-Law	20
3rd Codec	G.711, 64 Kbps, A-Law	20
4th Codec	G.729, 8 Kbps	20
5th Codec	G.722/16000	20

2. Configure the parameters using the table below as reference, and then click **Submit**.

➢ To define the codecs using the Configuration File:

- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and configure the parameters using the table below as reference.

Table 3-18: Codec Parameters

Parameter	Description
[voip/codec/codec_info/%d/enabled]	Determines the codecs that you want to implement and their priority. Up to five codecs can be configured, where the first codec (i.e., **voip/codec/0/…**) has the highest priority. To make a call, at least one codec must be configured. In addition, for best performance it is recommended to select as many codecs as possible. When you start a call to a remote party, your available codecs are compared with the remote party's to determine the codec to use. If there is no codec that both parties have made available, the call attempt fails. Note that if more than one codec is common to both parties, you cannot force which of the common codecs are used by the remote party's client. To force the use of a specific codec, configure the list with only that specific codec. The *%d* variable stands for the priority: ▪ **[0]** - Disabled ▪ **[1]** (default) - Enabled

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Parameter	Description
Codec Type **[voip/codec/codec_info /%d/name]**	Name of the codec. The variable *%d* depicts the index number of the codec entry and its priority, where the first codec (i.e. **voip/codec/codec_info/0/name=…**) has the highest priority. The valid codec parameters are: ▪ **[G722]** G.722 (default) ▪ **[PCMA]** G.711 A-Law ▪ **[PCMU]** G.711 Mu-Law ▪ [G729] G.729 For example, **voip/codec/codec_info/0/name=G722**. **Note**: Specific codecs require specific firmware files. For more information, refer to the *Release Notes*.
Packetization Time **[voip/codec/codec_info /%d/ptime]**	Packetization time - length of the digital voice segment that each packet holds. The default is 20 millisecond packets, excluding G.723 which is 30 millisecond packets.
G.723 Bitrate **[voip/codec/g723_bitrate]**	Low or high bit rate for G.723. ▪ [LOW] Low ▪ **[HIGH]** High (default)
[voip/codec/g722_bitrate]	G.722 bit rate. ▪ [G722_64K] (default) ▪ [G722_56K] ▪ [G722_48K] **Note:** Currently, only 64bps is supported.
[system/activation_keys/amr_coder]	Activation key (string) required to unlock AMR coder (relevant for supporting firmware only).

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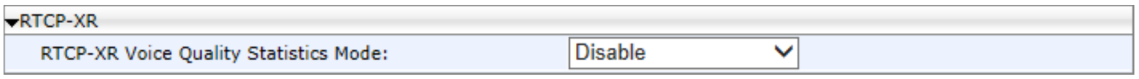
3.3.7.3 Configuring RTCP Extended Report

This section shows how to configure Extended Report for RTP Control Protocol (RTCP-XR) working mode.

➢ To configure RTCP-XR using the Web interface:

1. Open the Media Streaming page (**Configuration** tab > **Voice Over IP** menu > **Media Streaming**).

Figure 3-23: Web Interface – Media Streaming - RTCP-XR



2. Configure the parameters using the table below as reference, and then click **Submit**.

➢ To configure RTCP_XR using the Configuration File:

- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and configure the parameter using the table below as reference.

Table 3-19: RTCP_XR Parameter

Parameter	Description
RTCP-XR Voice Quality Statistics Mode **[voip/rtcp_xr/vq_statistics/mode]**	Sets RTCP_XR working mode. Either: ▪ [**DISABLE**] (default) ▪ [EVENTS_ONLY] ▪ [REMOTE_AND_EVENTS]

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3.4 Configuring Security

3.4.1 Using the Encryption Tool

This section shows how to use the encryption tool.

3.4.1.1 Encrypting Configuration Files

This section shows how to encrypt the configuration file when, for example, it is sent over an unsecure network.

➢ **To encrypt the configuration file:**

- At the command line prompt, specify the following:

```
encryption_tool.exe –f <filename>.cfg
```

where <*file name*>.cfg specifies the name of the Configuration file that you wish to encrypt.

Once the Configuration file is encrypted, it receives the suffix '.cfx' (e.g. Conf.cfx). This is the file that you should specify in the 'Configuration URL' and the 'Dynamic Configuration URL' fields when performing automatic provisioning (see Part II 'Automatic Provisioning').

3.4.2 Encrypting Passwords in Configuration File

This section shows how to encrypt IP phone passwords used in the configuration process, for example, the 'System' password and the 'SIP Authentication' password.

➢ **To encrypt passwords:**

1. At the command line prompt, specify the following:

```
encryption_tool.exe –s <password_string>
```

where <*password_string*> specifies the string of the password that you wish to encrypt.

Once the password is encrypted, a string is generated with the following syntax:

```
{"<encrypted_string>"}
```

For example:

```
{"0qrNRpSJ6aE="}
```


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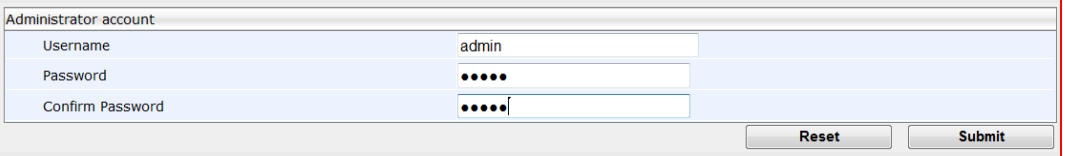
Note: Due to a temporary limitation, the system/password cannot be encrypted using the encryption_tool.exe.

To encrypt the string for the system/password, use the phone. Access the phone's Web interface, click the **Management** tab > **Administration** > **Users**, enter the required password, and then click **Submit**.



Then access the 'Configuration File' page, find **system/password** and use this string.
For example, for **12345**, the encrypted string will be:
$1$9.K/H0g1$IcznxPOBgYmQxAj2eyn7R/
Then proceed to step 2 below.

2. Copy the generated string (including the {“ “}) with the syntax specified above to the relevant parameter in the Configuration file.

   For example, if you encrypted the SIP authentication password, the following is displayed in the relevant line in the configuration file:

```
voip/line/0/auth_password={"0qrNRpSJ6aE="}
```

Note: It is recommended to encrypt the System password using this procedure. If you choose not to do so, then the System password is by default encrypted using MD5.

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3.4.3 Managing Security Certificates

AudioCodes IP phones are loaded with factory-set preinstalled certificate files: private key file, certificate file and a Trusted Root CA file that is signed by AudioCodes.

Whenever the IP phone authenticates with a remote server, it can be authenticated using these certificate files. Each IP phone receives a uniquely generated private key certificate file based on its MAC address. If the remote server is configured to authenticate the client and AudioCodes factory-set certificates are used for authentication, then the AudioCodes Certificate and AudioCodes Trusted Root CA must be downloaded to the remote server. These files can be downloaded from the AudioCodes Web site. For more information, contact your local AudioCodes sales representative. If you use the AudioCodes Redirect server to obtain firmware and configuration files, then the factory-set certificates are used to authenticate the connection with this server. If default certificate files are missing or deleted, the phone will regenerate these files automatically the next time it is powered up.

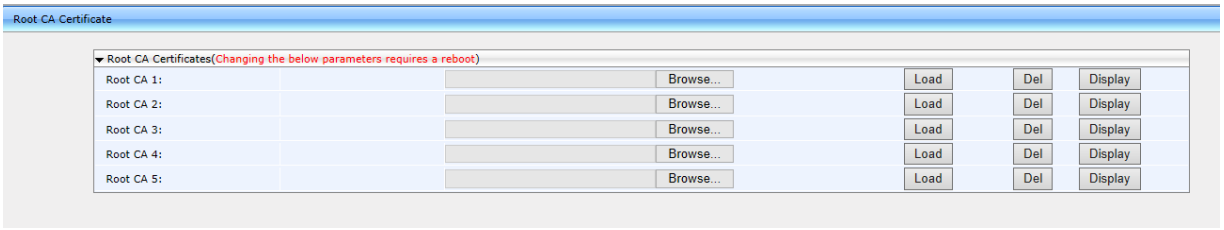
3.4.3.1 Loading the Root CA Certificate to the Phone

The section shows how to load the root CA certificate to the phone. The certificate enables signing in with 802.1x Authentication. With Microsoft Lync, more than one certificate file is loaded automatically using DHCP Option 43.

➢ **To load the root CA certificate to the phone:**

1. Open the Root CA Certificate page (**Configuration** tab > **Security** menu > **Root CA Certificate**).

Figure 3-24: Web Interface – Root CA Certificate



2. Click **Browse** to navigate to the certificate file, and then click the **Load** button to upload it to the phone. The maximum number you can load to the phone is 5. Click the **Del** button to delete a load if necessary. Click the **Display** button to display the certificate if you require viewing it.

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Table 3-20: Root CA Certificate Parameters

Parameter	Description
Root CA 1 **[security/ca_certificate/0/uri=]**	The first root CA certificate loaded to the phone.
Root CA 2 **[security/ca_certificate/1/uri=]**	The second root CA certificate loaded to the phone.
Root CA 3 **[security/ca_certificate/2/uri=]**	The third root CA certificate loaded to the phone.
Root CA 4 **[security/ca_certificate/3/uri=]**	The fourth root CA certificate loaded to the phone.
Root CA 5 **[security/ca_certificate/4/uri=]**	The fifth root CA certificate loaded to the phone.

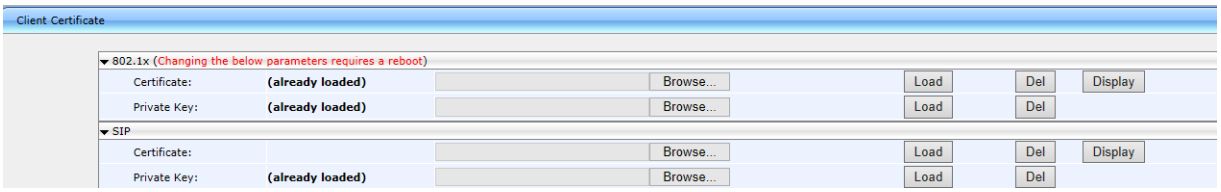
3.4.3.2 Loading the Client Certificate to the Phone

The section shows how to load the Client Certificate to the phone.

➢ **To load the Client Certificate to the phone:**

1. Open the Client Certificate page (**Configuration** tab > **Security** menu > **Client Certificate**).

Figure 3-25: Web Interface – Client Certificate


Client Certificate
802.1x (Changing the below parameters requires a reboot)
Certificate: (already loaded) Browse... Load Del Display
Private Key: (already loaded) Browse... Load Del
SIP
Certificate: Browse... Load Del Display
Private Key: (already loaded) Browse... Load Del

2. Refer to the table below. You can also load the file/s to the phone using the Configuration File. In the table below, the Configuration File parameters are in square parenthesis in bold.

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Table 3-21: Client Certificate Parameters

Parameter	Description
Certificate **[security/sip_certificate_uri=]**	Loads the Client Certificate for SIP TLS (SIP calls with Transport Layer Security) to the phone.
Private Key **[security/sip_private_key_uri]**	Loads the Client Private Key for SIP TLS (SIP calls with Transport Layer Security) to the phone.
Certificate **[security/ieee802_1x_certificate_uri=]**	Loads the Client Certificate for 802.1X Authentication to the phone.
Private Key **[security/ieee802_1x_private_key_uri=]**	Loads the Client Private Key for 802.1X Authentication to the phone.

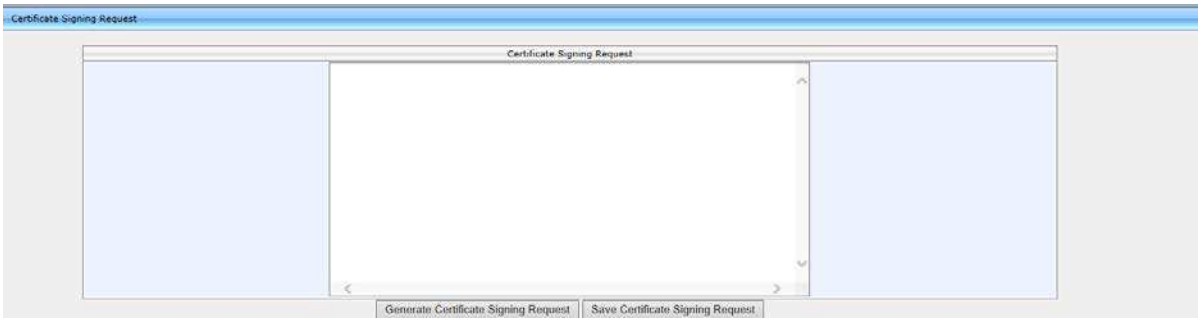
3.4.3.3 Generating a Certificate Signing Request

The section shows how to generate a certificate signing request (CSR) to send to the Certifcate Authority (CA) for the CA to sign the Client Certificate.

➢ To generate a CSR:

1. Open the Certificate Signing Request page (**Configuration** tab > **Security** menu > **Certificate Signing Request**).

Figure 3-26: Web Interface – Certificate Signing Request



2. Press the **Generate Certificate Signing Request** button; the phone creates a CSR file.
3. Press the **Save Certificate Signing Request** button and download the CSR file to your PC.
4. Send the CSR file to the Certificate Authority to sign the Client Certificate.
5. You can load the Client Certificate to the phone for 802.1X Authentication or SIP TLS.

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3.4.4 Configuring 802.1X Authentication

802.1X Authentication is an IEEE Standard for port-based Network Access Control (PNAC). It's part of the IEEE 802.1 group of networking protocols. It provides an authentication mechanism for devices joining a LAN or WLAN.

The employee's PC negotiates 802.1X. Messages are sent transparent to the enterprise switch.The IP phone is uninvolved in the negotiation, but if an employee's PC is disconnected, their IP phone notifies the switch. If an employee's PC is disconnected from the IP phone, a PROXY-EAP-LOGOFF mechanism lets the IP phone immediately log off the port from the authentication server in order to not let anyone else connect to it.

The phone performs like this:

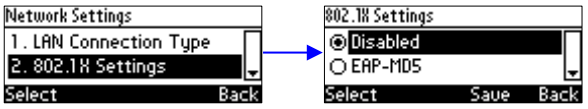
- IP phone and PC connected to IP phone's PC port successfully perform 802.1X authentication. The authentication server records the IP phone and PC as authorized.
- If the PC is disconnected from IP phone's PC port, the phone sends an EAPoL-Logoff message for the PC. The authentication server then records the PC as unauthorized.
- If the PC reconnects to the IP phone's PC port, the authentication server requests the PC to perform 802.1X authentication again.

3.4.4.1 Using the Phone LCD

This section shows how to configure 802.1X from the phone LCD.

➢ **To configure 802.1X:**

1. Open the 802.1X Settings screen (**MENU** key > **Administration** > **Network Settings**).



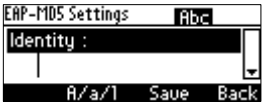
2. Navigate to and select either:
   - **Disabled** – disables the 802.1X feature
   - **EAP-MD5** – see Section 3.4.4.2
   - **EAP-TLS** - see Section 3.4.4.3

3.4.4.2 EAP MD5 Mode

This section shows how to configure EAP (Extensible Authentication Protocol) MD5 mode for 802.1X Authentication.

➢ **To configure EAP MD5 mode for 802.1X:**

1. Navigate to the **EAP-MD5** option and press the **Edit** softkey:



2. Enter this information:
   - **Identity:** User ID
   - **Password:** MD5 password (optional)
3. Press the **Save** softkey; a message appears notifying you that the phone will restart.
4. Press **Apply**.

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3.4.4.3 EAP TLS Mode

This section shows how to configure EAP TLS mode for 802.1X.

➢ **To configure EAP TLS mode for 802.1X:**

- Navigate to the **EAP-TLS** option and press the **Save** softkey.

3.4.5 Using the Web Interface / Configuration File

This section shows how to configure 802.1X from the Web interface or using the Configuration File.

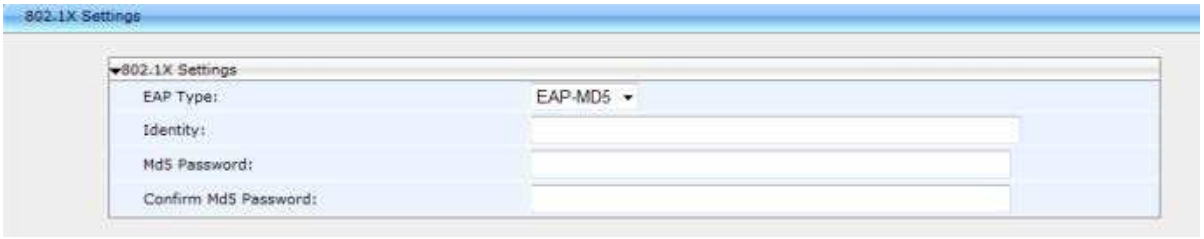
3.4.5.1 EAP MD5 Mode

This section shows how to configure 802.1X settings for EAP MD5.

➢ **To configure the phone's 802.1X settings for EAP MD5 using the Web interface:**

1. Open the 802.1X Settings page (**Network Connections** > **802.1X Settings**).

Figure 3-27: Web Interface - 802.1X Settings - EAP MD5



2. Configure the parameters using the table below as reference, and then click **Submit**.

➢ **To configure EAP MD5 using the Configuration File:**

- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and configure the parameters using the table below as reference.

Table 3-22: EAP MD5 Parameters

Parameter	Description
EAP Type **[/network/lan/_802_1x/eap_type]**	Sets 802.1X Extensible Authentication Protocol mode [Disable] = Disables the use of 802.1X [EAP_MD5]=Authentication is implemented by user name and password (Password is optional).
Identity **[/network/lan/_802_1x/md5_identity]**	User ID for MD5 mode.
MD5 password **[/network/lan/_802_1x/md5_password]**	Password for MD5 mode (leave blank if no password).

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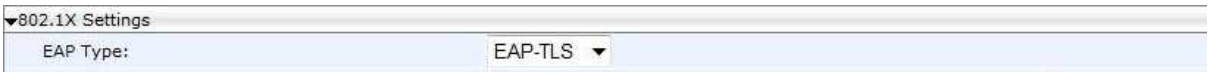
3.4.5.2 EAP TLS Mode

This section shows how to configure phone's 802.1X settings for EAP TLS using the Web interface or Configuration File.

➢ **To configure 802.1X settings for EAP TLS using the Web interface:**

1. Open the 802.1X Settings page (**Configuration** > **Network Settings** > **802.1X Settings**) and select **TLS** as 'EAP Type'.

Figure 3-28: Web Interface - 802.1X Settings – EAP-TLS



2. Click **Submit**.

➢ **To configure EAP TLS using the Configuration File:**

- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and configure the parameters using the table below as reference.

Table 3-23: EAP TLS Parameters

Parameter	Description
EAP Type **[/network/lan/_802_1x/eap_type]**	Sets 802.1X EAP mode. [Disable] = Disables the use of 802.1X [EAP_TLS]= Authentication is implemented by Certificate, Client Certificate, and Client Private Key.

Note: Make sure that the Root CA certificate and the Private Key certificate are installed on the RADIUS server as well.

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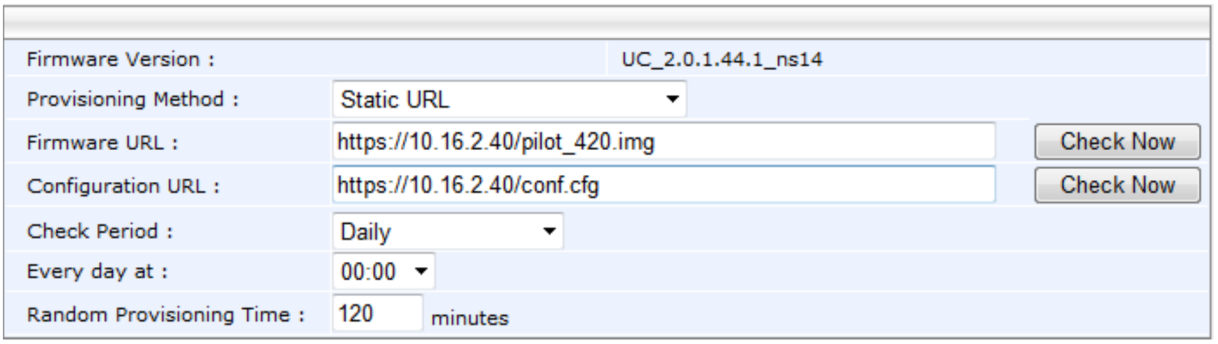
3.4.6 Configuring HTTPS

This section shows how to access the Web interface using HTTPS, for example, https://10.16.2.40, to secure provisioning.

Firmware and configuration files will then be loaded to the phone from the HTTPS server. The Firmware URL and Configuration URL parameters in the screen below show how HTTPS is defined:

Figure 30-1: Web Interface – HTTPS



Note: To implement secure provisioning using HTTPS, the HTTPS server on the far end (from where you are loading the files) must also support HTTPS.

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3.5 Configuring Advanced Applications

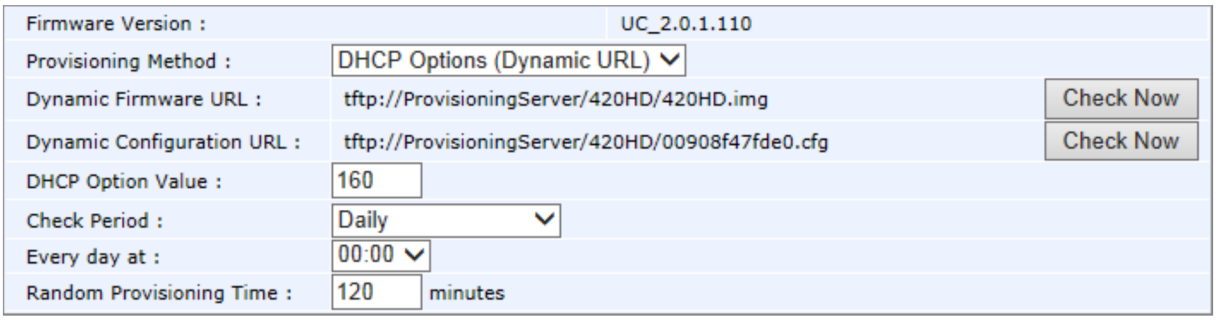
3.5.1 Dynamic URL Provisioning

Dynamic Host Configuration Protocol (DHCP) can be used to automatically provision all phones in the enterprise. The DHCP feature can be configured using the Web interface or Configuration File.

➢ To configure DHCP using the Web interface:

1. Open the Automatic Update page (**Management** tab > **Automatic Update** menu > **Automatic Provisioning**).

Figure 3-29: Web Interface - Automatic Provisioning – Dynamic URL



2. Configure the parameters using the table below as reference and click **Submit**.

➢ To configure DHCP using the Configuration File:

- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and configure the parameters using the table below as reference.

Table 3-24: Configuring Automatic Provisioning Performed by DHCP

Parameter	Description
Note: To add a value to these parameters, enter ***provisioning/*** followed by the parameter name equals the value (e.g. ***provisioning/method=dynamic***).	
Provisioning Method **[provisioning/method]**	Defines the provisioning method: ▪ **[Disable]** Disable - Automatic update is disabled. The phone attempts to upgrade its firmware and configuration ▪ **[Dynamic]** DHCP Options (Dynamic URL) (default) - Using DHCP options 160 or 66/67 for provisioning ▪ **[Static]** Static URL - Using Static URL for provisioning
DHCP Option Value **[provisioning/url_option_value]**	Determines the DHCP option number to be used for receiving the URL for provisioning. The default value is 160. The phone supports DHCP Option 160 for complete URL and Options 66/67 for TFTP usage. Option 160 has the highest priority and if absent, Options 66/67 are used. The following syntax is available for DHCP option

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Parameter	Description
	160: ▪ <protocol>://<server IP address or host name> ▪ <protocol>://<server IP address or host name>/<firmware file name> ▪ <protocol>://<server IP address or host name>/<firmware file name>;<configuration file name> ▪ <protocol>://<server IP address or host name>/;<configuration file name> Where <protocol> can be either "ftp", "tftp", "http" or "https" and where <configuration file name> can be either: ▪ A unique configuration file, per phone, for example: <MAC>.cfg -or- ▪ A global configuration file, per deployment, for example, 420HD.cfg Unique Configuration Example **http://192.168.2.1/different.img;<MAC>.cfg** The retrieved firmware file is *different.img* and the configuration file name is *<MAC>.cfg* such as *001122334455.cfg* Global Configuration Example **http://192.168.2.1/<420HD>.cfg** The configuration file name is *420HD.cfg* The following syntax is available for DHCP Options 66/67: ▪ Option 66 must be a valid IP address or host name of a TFTP server only. ▪ Option 67 must be the firmware name. If Option 67 is absent, the phone requests for the 420HD.img image file. For example: ▪ **Option 66:** 192.168.2.1 or myTFTPServer ▪ **Option 67:** 420HD_2.0.9.img **Notes:** ▪ This parameter is applicable only when **method** is configured to "Dynamic". It is recommended to leave the parameter at its default value to avoid conflict with other DHCP options settings.
Random Provisioning Time **[provisioning/random_provisioning_time]**	Defines the maximum random number to start the provisioning process. This is used for periodic checking of firmware and configuration files to avoid multiple devices from starting the upgrade process at the same time. When the device is meant to start the upgrade, the device randomly selects a number between 1 and the value set for **random_provisioning_time** and performs the

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Parameter	Description
	check only after the random time. The valid range is 0-65535. The default value is 120.
Check Period **[provisioning/period/type]**	Defines the period type for automatic provisioning: ▪ **[hourly]** Hourly **-** Sets an interval in hours. ▪ **[daily]** Daily (default) - Sets an hour in the day. ▪ **[weekly]** Weekly - Sets a day in the week and an hour in the day. ▪ **[powerup]** On Power-up Only - The phone tries to upgrade only after power-up.
Every (Check Period = Hourly) **[provisioning/period/hourly/hours_interval]**	The interval in hours for automatically checking for new firmware and configuration files. The valid range is 1 to 168. The default is 24. **Note:** This parameter is applicable only when **`type`** is configured to "hourly".
Every day at **[provisioning/period/daily/time]**	The hour in the day for automatically checking for new firmware and configuration files. The format of this value is **hh:mm**, where **hh** is hour and **mm** is minutes. For example, **`00:30.`** The default time is **00:00**. **Note:** This parameter is applicable only when **type** is configured to "daily".
Every (Check Period = Day) **[provisioning/period/weekly/day]**	The day in the week for automatically checking for new firmware and configuration files. ▪ **[Sunday]** Sunday (default) ▪ [Monday] Monday ▪ [Tuesday] Tuesday ▪ [Wednesday] Wednesday ▪ [Thursday] Thursday ▪ [Friday] Friday ▪ [Saturday] Saturday **Note:** This parameter is applicable only when **type** is configured to "weekly".
Every (Check Period = Weekly) **[provisioning/period/weekly/time]**	The hour in the day for automatically checking for new firmware and configuration files. The format of this value is: **hh:mm**, where **hh** is hour and **mm** is minutes. For example: **`00:30`** The default time is **00:00**. **Note:** This parameter is applicable only when **type** is configured to "weekly".
provisioning/XXX_uri	The URI that allows the administrator to retrieve relevant information from separate files. The URI's can include specific protocol and path of the provisioning server or alternatively, the files can be retrieved from the server whose information was provided during provisioning (e.g. DHCP options 66/67 or 160). For example, in the below setting, *YYY.ext* is retrieved from the server whose information was provided during provisioning (e.g. DHCP options

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Parameter	Description
	66/67 or 160: **provisioning/XXX_uri=YYY.ext** Alternatively, the full URL and protocol can be set as follows: **provisioning/XXX_uri=<protocol>://<full path>/YYY.ext** For example: ▪ provisioning/XXX_uri=tftp://10.10.10.10/YYY.ext ▪ provisioning/XXX_uri=ftp:// 10.10.10.10/YYY.ext ▪ provisioning/XXX_uri=http:// 10.10.10.10/YYY.ext ▪ provisioning/XXX_uri=https:// 10.10.10.10/YYY.ext

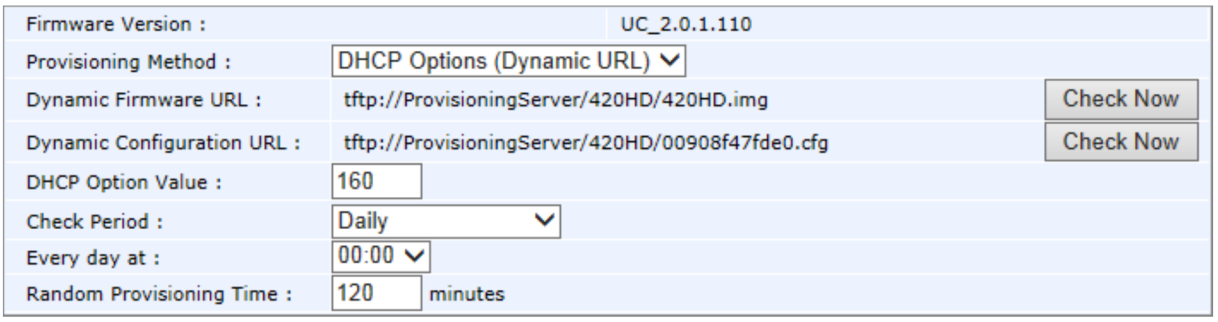
3.5.1.1 DHCP Option 160

DHCP Option 160 can be configured using the Web interface.

➢ **To configure DHCP Option 160 using the Web interface:**

1. Open the Automatic Provisioning page (**Management** tab > **Automatic Update** menu > **Automatic Provisioning**).

Figure 3-30: Web Interface - Automatic Provisioning - DHCP Option 160



2. From the 'Provisioning Method' drop-down list, select **DHCP Option (Dynamic URL)**.
3. In the 'DHCP Option Value' field, enter **160**.
4. Configure the remaining parameters and click **Submit**.
5. After reboot, confirm that the firmware and configuration files have been updated.

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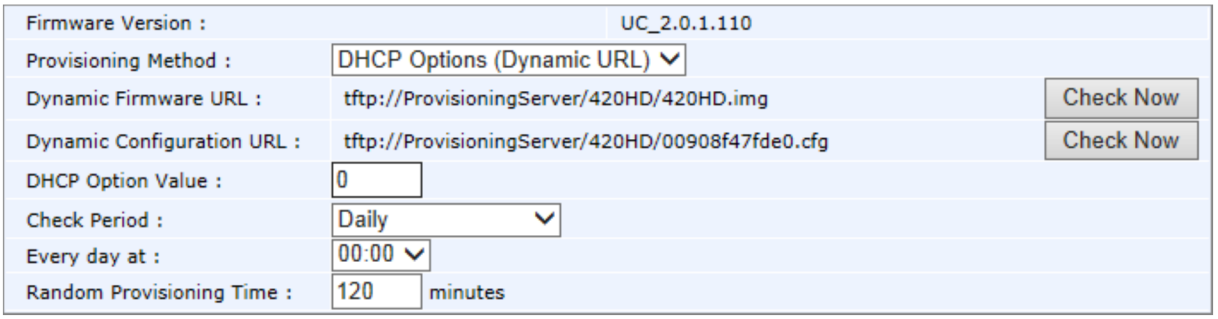
3.5.1.2 DHCP Options 66 and 67

DHCP Options 66 and 67 can be configured using the Web as shown below.

➢ **To configure DHCP Options 66 and 67 using the Web interface:**

1. Open the Automatic provisioning page (**Management** tab > **Automatic Update** menu > **Automatic Provisioning**).

Figure 3-31: Web Interface – Automatic Provisioning - DHCP Options 66/67



2. From 'Provisioning Method', select **DHCP Option (Dynamic URL)**.
3. In the 'DHCP Option Value' field, enter **0**.
4. Configure the remaining parameters and click **Submit**.
5. After the reboot, confirm that the firmware and configuration files were updated.

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3.5.2 Configuring Date and Time

Note: By default, date and time settings are *automatically provisioned* via the enterprise DHCP server when the phone is connected to the Internet and to the power supply, but you can *manually* change them if required. This section describes how.

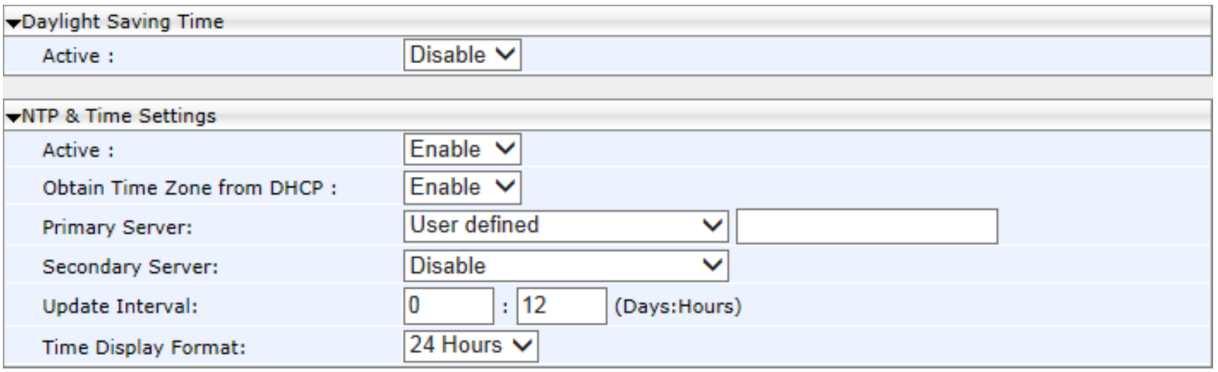
The phone automatically retrieves date and time from a Network Time Protocol (NTP) server when it is connected to the Internet. NTP is a protocol for distributing Coordinated Universal Time (UTC) by synchronizing the clocks of computer systems over packet-switched, variable-latency data networks.

Date and time can also be *manually* configured using the Web interface.

➢ To manually configure date and time using the Web interface:

- Open the Date and Time page (**Configuration** tab > **Advanced Applications** menu > **Date and Time**).

Figure 3-32: Web Interface - Date and Time



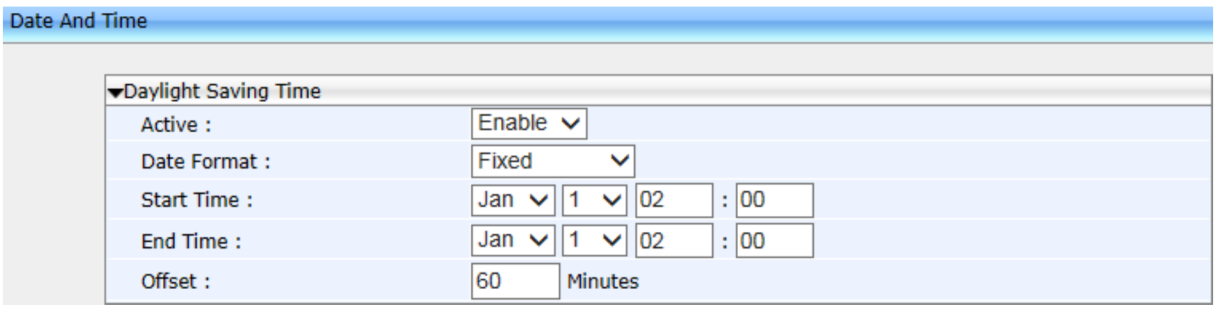
3.5.2.1 Configuring Daylight Saving Time

You can configure Daylight Saving Time using the Web interface or Configuration File.

➢ To configure Daylight Saving Time using the Web interface:

1. In the Date and Time page (**Configuration** tab > **Advanced Applications** menu > **Date and Time**) shown above, set the 'Active' parameter to **Enable**; the page section shown below opens.

Figure 3-33: Web Interface – Daylight Saving Time



2. Configure the settings using the table below as reference.

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➢ To configure Daylight Saving Time using the Configuration File:

- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and configure the parameter using the table below as reference.

Table 3-25: Daylight Saving Time Parameters

Parameter	Description
Active **[system/daylight_saving/activate]**	Determines whether the phone automatically detects the Daylight Saving Time for the selected Time Zone. ▪ **[DISABLE]** Disable (default) ▪ [ENABLE] Enable
Date Format **[system/daylight_saving/mode]**	Configures the date format. Valid values are: **FIXED=** Date is specified as: Month, Day of month. **DayOfWeek =** Date is specified as Month, Week of month, Day of week.
Start Time **[system/daylight_saving/start_date]**	This subsection defines the starting day for the daylight saving offset. ▪ **[month]** - defines specific month in year ▪ **[day]** - defines specific day in month ▪ **[hour]** - defines specific hour in day ▪ **[minute]** - defines specific minute in hour Example: To configure the phone to start daylight savings with a specific offset on February 22nd at 14:30, set the following: **system/daylight_saving/start_date/month=2** **system/daylight_saving/start_date/day=22** **system/daylight_saving/start_date/hour=14** **system/daylight_saving/start_date/minute=30**
Start Time **[system/daylight_saving/start_date/month]**	The month in a year. The valid range is 1 to 12.
Start Time **[system/daylight_saving/start_date/day]**	The day in a month. The valid range is 1 to 31.
Start Time **[system/daylight_saving/start_date/hour]**	The hour in the day. The valid range is 0 to 23.
Start Time **[system/daylight_saving/start_date/minute]**	The minute in an hour. The valid range is 0 to 59.

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Parameter	Description
End Time **[system/daylight_saving/end_date]**	This subsection defines the ending day for the daylight saving offset. ▪ **[month]** - defines the specific month in a year ▪ **[day]** - defines the specific day in a month ▪ **[hour]** - defines the specific hour in a day ▪ **[minute]** - defines the specific minute in an hour For example: To configure the phone to end the daylight savings on July 16th at 22:15, set the following: **system/ntp/daylight_saving/end_date/month=7** **system/ntp/daylight_saving/end_date/day=16** **system/ntp/daylight_saving/end_date/hour=22** **system/ntp/daylight_saving/end_date/minute=15**
End Time **[system/daylight_saving/end_date/month]**	The month in a year. The valid range is 1 to 12.
End Time **[system/daylight_saving/end_date/day]**	The day in a month. The valid range is 1 to 31.
End Time **[system/daylight_saving/end_date/hour]**	The hour in the day The valid range is 0 to 23.
End Time **[system/daylight_saving/end_date/minute]**	The minute in an hour. The valid range is 0 to 59.
Offset **[system/daylight_saving/offset]**	The offset value for the daylight saving. The valid range is 0 to 180. The default offset is 60.
[system/daylight_saving/start_date/week]	Relevant to 'Day of week' mode: The week of month (values 1-5) for start of daylight saving time.
[system/daylight_saving/start_date/day_of_week]	Relevant to 'Day of week' mode: The day of week for daylight saving time start Valid values : **[SUNDAY]** **[MONDAY]** **[TUESDAY]** **[WEDNESDAY]** **[THURSDAY]** **[FRIDAY]** **[SATURDAY]**
[system/daylight_saving/end_date/week]	Relevant to 'Day of week' mode: The week of month (values 1-5) for end of daylight saving time.

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Parameter	Description
[system/daylight_saving/end_date/day_of_week]	Relevant to 'Day of week' mode: The day of week for daylight saving time start Valid values : **[SUNDAY]** (Default) **[MONDAY]** **[TUESDAY]** **[WEDNESDAY]** **[THURSDAY]** **[FRIDAY]** **[SATURDAY]**

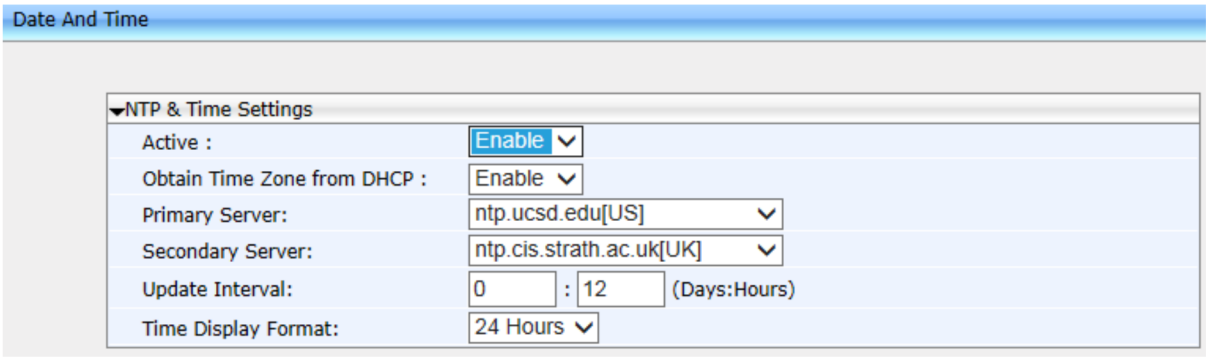
3.5.2.2 Configuring NTP Server

The Network Time Protocol (NTP) server can be configured using the Web interface or Configuration File.

➢ To configure the NTP server using the Web interface:

1. Open the Date and Time page (**Configuration** tab > **Advanced Applications** menu > **Date and Time**).
2. Configure the parameters under the NTP & Time Settings screen section using the table below as reference, and then click **Submit**.

Figure 3-34: Web Interface - NTP & Time Settings



➢ To configure the NTP server using the Configuration File:

- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and configure the parameter using the table below as reference.

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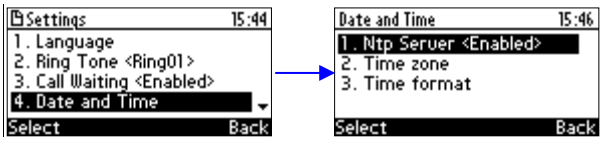
Table 3-26: NTP Server Parameters

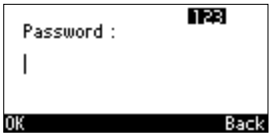
Parameter	Description
Active **[system/ntp/enabled]**	Enables the NTP server from which the phone retrieves the date and time. ▪ **[0]** Disable (default) ▪ **[1]** Enable – obtains the time information from a configured NTP server
Primary Server **[system/ntp/primary_server_address]**	Defines the address of the main NTP server. This can be a domain name, e.g., **tick.nap.com.ar**. You can select from the dropdown or leave the dropdown as **User defined and manually** define your domain in the adjacent field.
Secondary Server **[system/ntp/secondary_server_address]**	Defines the address of the secondary NTP server.
Update Interval **[system/ntp/sync_time]**	This sub-section defines how often the phone must perform an update with the NTP server. ▪ **[days]** - defines the number of days ▪ **[hours]** - defines the number of hours For example: To configure the phone to perform an update with an NTP server every 1 day and 6 hours, set the following: **system/ntp/sync_time/days=1** **system/ntp/sync_time/hours=6**
Update Interval **[system/ntp/sync_time/days]**	The number of days. The valid range is 0 to 7. The default of days is 0.
Update Interval **[system/ntp/sync_time/hours]**	The number of hours. The valid range is 0 to 24. The default is 12.
Time Display Format **[system/ntp/time_display_format]**	The format of the time displayed on the LCD screen. ▪ **[24Hour]** (default) ▪ [12Hour]

➢ To enable the NTP server in the phone's LCD:

1. Access the **Date and Time** screen (**MENU** key > **Settings** > **Date and Time**).



2. If *not* already 'Enabled', press the **Select** softkey:



3. Enter the password and press the **OK** softkey; the NTP server is enabled.

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3.5.2.3 Configuring NTP Server via DHCP

If the phone is set to obtain GMT offsets and NTP servers via DHCP (default), it receives the following fields in the DHCP options:

- Primary Server and Secondary Server – (Option 4 or 42).

Note: If both options (4 and 42) are received, the higher priority is given to Option 42.

- Time Zone – (Option 2)

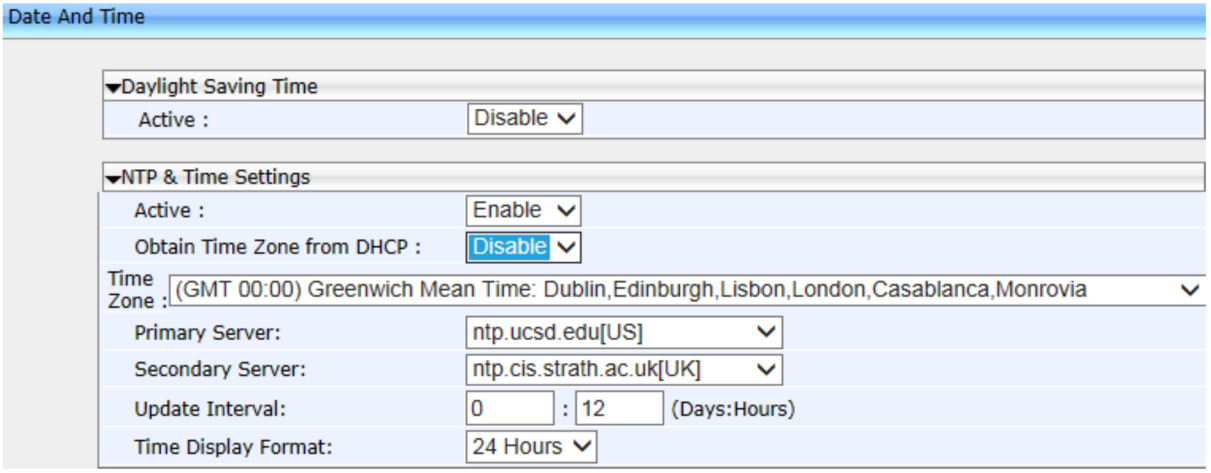
The phone sends an NTP request to the Primary NTP server. If there is no response, the NTP request is sent to the Secondary NTP server.

After obtaining the time from the server, it adds the GMT offset in Option 2. This is the updated system time.

➢ To manually configure NTP / GMT offset using Web interface:

1. Open the Date and Time page (**Configuration** tab > **Advanced Applications** menu > **Date and Time**).
2. From the 'Obtain Time Zone From DHCP' drop-down list, select **Disable**; the screen below is shown.

Figure 3-35: Web Interface - NTP and Time Settings



3. Configure the NTP and Time Settings using the table below as reference, and then click **Submit**.

Note: If the 'Obtain Time Zone from DHCP' parameter is set to **Disabled**, only the Primary Server NTP server parameter will be modifyable.

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Table 3-27: NTP Server and GMT Parameters

Parameter	Description
Time Zone **[system/ntp/gmt_offset]**	Default is **00:00** Enables the NTP server from which the phone retrieves the date and time. ▪ **[0]** Disable ▪ **[1]** Enable – obtains the time information from a configured NTP server
network/lan/dhcp/ntp/server_list/enabled	Enables prioritization of the NTP server's information received from the DHCP server (Option fields 42 or 4), over the static configuration (**system/ntp/primary_server_address** and **system/ntp/secondary_server_address**). ▪ **[0]** Disable ▪ **[1]** Enable (default)
network/lan/dhcp/ntp/gmt_offset/enabled	Enables prioritization of the NTP GMT offset information received from the DHCP server (Option field 2), over the static configuration (**system/ntp/gmt_offset**). ▪ **[0]** Disable ▪ **[1]** Enable (default)

3.5.3 Configuring Contacts (LDAP)

This section shows how to configure Lightweight Directory Access Protocol (LDAP) using the Web interface or the Configuration File.

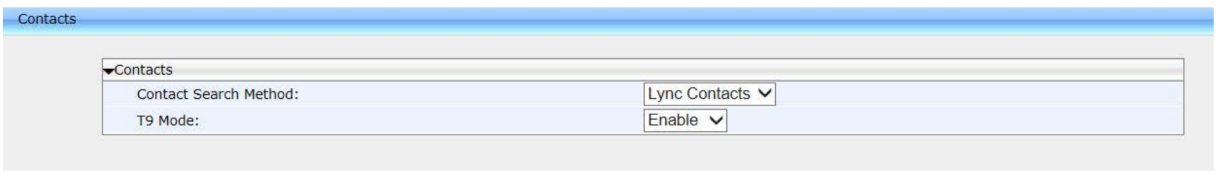
Note: It's advisable not to change the default setup.

LDAP is an application protocol for accessing and maintaining distributed directory information services over an IP network.
See RFC 4510 for a full description.

➢ To configure LDAP using the Web interface:

1. Open the Contacts page (**Configuration** tab > **Advanced Applications** > **Contacts**) and select **LDAP** from the 'Contact Search Method' dropdown list (the default is **Lync Contacts**).

Figure 3-36: Web Interface – Contact Search Method



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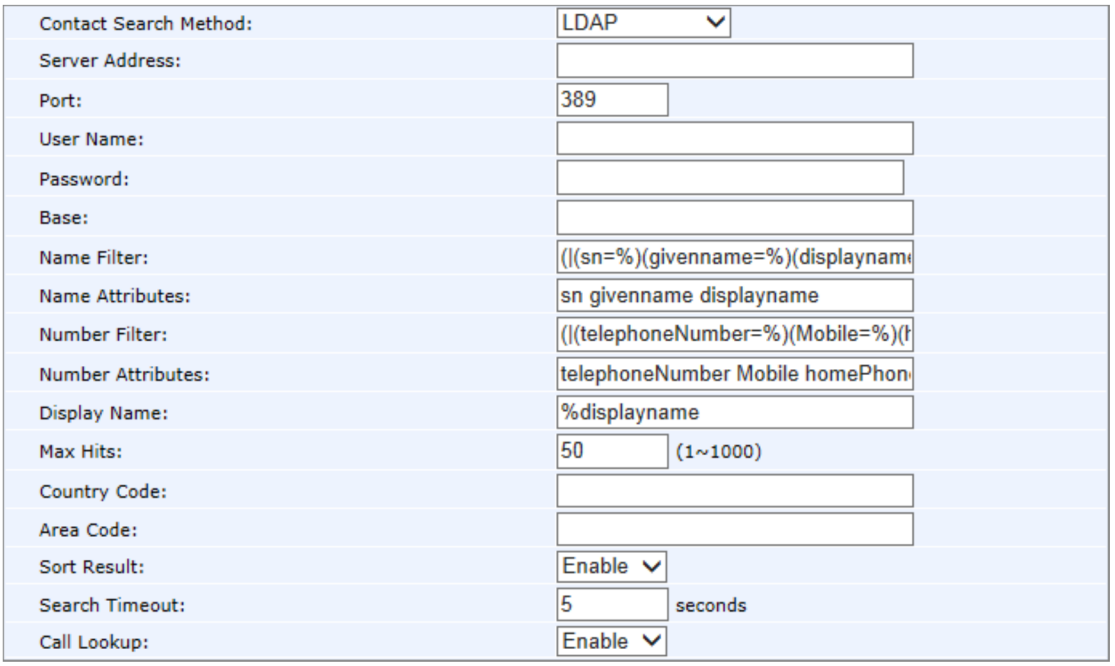

2. Configure the parameters using the table below as reference and click **Submit**.

➢ To configure LDAP using the Configuration File:

- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and configure the parameters using the table below as reference.

Table 3-28: LDAP Parameters

Parameter Name	Description
Active **[system/ldap/enabled]**	Enables or disable LDAP.
Server Address **[system/ldap/server_address]**	Defines the IP address or URL of the LDAP server.
Port **[system/ldap/port]**	Defines the LDAP service port.
User Name **[system/ldap/user_name]**	Defines the user name used for the LDAP search request.
Password **[system/ldap/password]**	Defines the password of the search requester.
Base **[system/ldap/base]**	Defines the access point on the LDAP tree.
Name Filter **[system/ldap/name_filter]**	Specifies your search pattern for name look ups. For example: When you type in the following field: *(&(telephoneNumber=*)(sn=%))*, the search result includes all LDAP records, which have the 'telephoneNumber' field set and the '("sn"-->surname)' field starting with the entered prefix. When you type in the following field:

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Parameter Name	Description
	(|(cn=%)(sn=%)), the search result includes all LDAP records which have the ("cn"-->CommonName) OR ("sn"-->Surname) field starting with the entered prefix. When you type in the field *(!(cn=%))*, the search result includes all LDAP records which "do not" have the "cn" field starting with the entered prefix.
Name Attribute **[system/ldap/name_attrs]**	Specifies the LDAP name attributes setting, which can be used to specify the "name" attributes of each record which is returned in the LDAP search results. When you type in the following field, for example, *cn sn displayName*", this requires you to specify 'cn-->commonName'. This is the Full name of the user, sn-->Surname, last name or family name and "displayName" fields for each LDAP record.
Number Filter **[system/ldap/number_filter]**	Specifies your search pattern for number look ups. When you type in the following field, for example, *(|(telephoneNumber=%)(Mobile=%)(ipPhone=%))* , the search result is all LDAP records which have the "telephoneNumber" OR "Mobile" OR "ipPhone"field match the number being searched. When you type in the following field: *(&(telephoneNumber=%)(sn=*))*, the search result is all LDAP records which have the "sn" field set and the "telephoneNumber" match the number being searched.
Number Attributes **[system/ldap/number_attrs]**	Specifies the LDAP number attributes setting, which can be used to specify the "number" attributes of each record which is returned in the LDAP search results. When you type in the following field, for example, *Mobile telephoneNumber ipPhone*, you must specify 'Mobile', 'telephoneNumber' and 'ipPhone' fields for each LDAP record.
Display Name **[system/ldap/display_name]**	Specifies the format in which the "name, e.g. "Mike Black" of each returned search result is displayed on the IPPHONE. When you type in the following field, for example:**%sn, %givenName***,* the displayed result returned should be "Black, Mike".
Max Hits **[system/ldap/max_hits]**	Specifies the maximum number of entries expected to be sent by the LDAP server (this parameter is sent to the LDAP server).
Sort Result **[system/ldap/sorting_result]**	Sorts the search result by display name on the client side.
[system/ldap/predict_text]	This parameter appears in the configuration file; however, it is currently not supported.
Search Timeout	The time out value for LDAP search (this

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Parameter Name	Description
[system/ldap/search_timeout]	parameter is sent to the LDAP server).
[system/ldap/ui/use_right_arrow_active_search]	This parameter appears in the configuration file; however, it is currently not supported.
[system/ldap/lookup_incoming_call]	This parameter appears in the configuration file; however, it is currently not supported.
Call Lookup **[system/ldap/call_lookup]**	Performs an LDAP search during call (search the display name for a number).
Country Code **[system/ldap/country_code]**	Defines the country code prefix added for number search.
Area Code **[system/ldap/area_code]**	Defines the area code prefix added for number search.
[system/ldap/minimal_name_search_length]	Starts to perform an LDAP search after x characters are input.
[system/ldap/send_queries_while_typing]	Sends an LDAP search each time the user presses a key (all keys with both number and letters).

3.5.4 Configuring T9

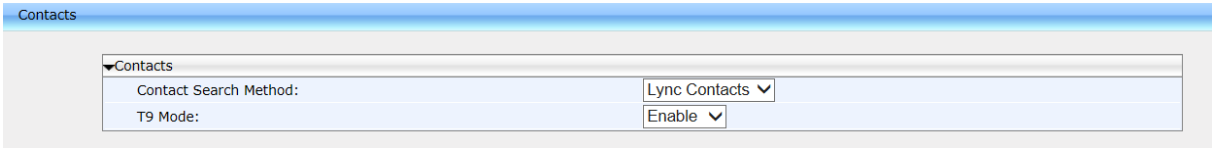
When searching for a contact in the Corporate Directory, users can press dial pad keys *to input letters*. Only a single press on any key, regardless of the letter's position on the key, is necessary

See the phone's *User's Manual* for more information.

➢ To configure T9 using the Web interface:

- Open the Contacts page (**Configuration** tab > **Advanced Applications** > **Contacts**) and make sure T9 is enabled (default). If it isn't, select **Enable** from the 'T9 Mode' dropdown list.

Figure 3-37: Web Interface – T9 Mode



➢ To configure T9 using the Configuration File:

- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and configure the parameter using the table below as reference.

Table 3-29: T9 Parameter

Parameter Name	Description
T9 Mode **[lync/contact_search_t9_enabled]**	Enables or disable T9 mode. Default=**Enable**.

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4 Configuring Microsoft Lync Features

This section show how to configure Microsoft Lync features.

4.1 Park Call

The IP phone lets users park a call, i.e., transfer a call to a "parking lot" for it to be picked up on any other phone in the enterprise by a party who must dial a retrieval number in order to retrieve it on that phone. The retrieval number is configured in the Lync server's parking lot parameter. The retrieval number can be changed if required.

To pre-configure Microsoft's Lync server for park call capability, see:

http://technet.microsoft.com/en-us/library/gg399014.aspx

Refer to all subsections.

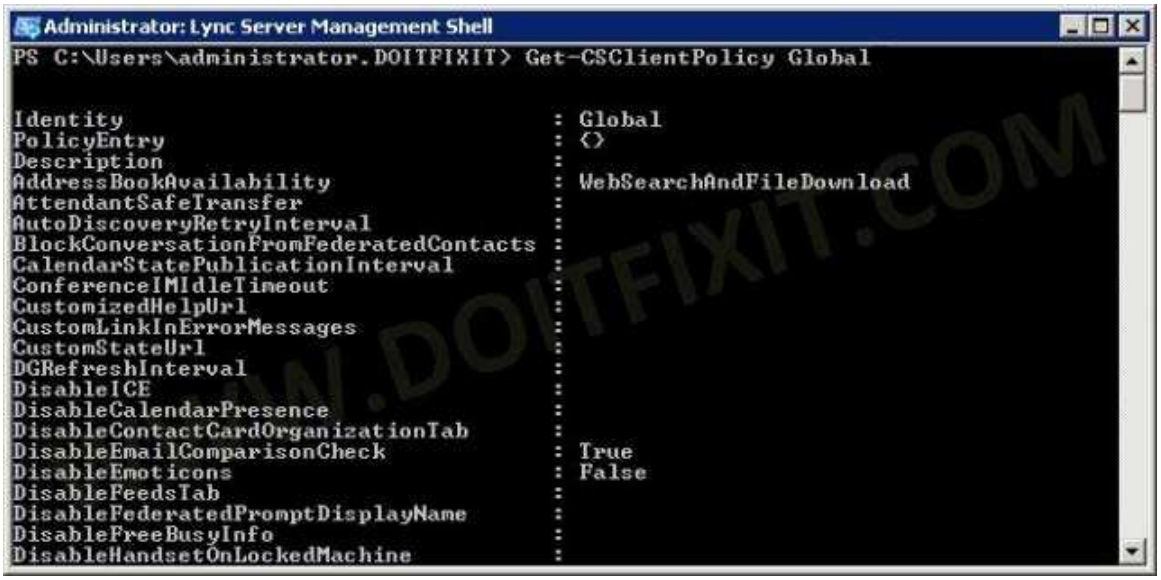
4.2 Music on Hold (MoH)

If a user puts a call on hold to answer an incoming call or to make another call, the party put on hold can hear music played. The Play Music on Hold feature allows this. By default, the Play MoH feature is not enabled in Lync.

➢ To enable the MoH feature on the Lync server:

1. In the Lync Server Management Shell, run the following command in order to view the current settings of the client policy:

```
Get-CSClientPolicy Global
```



2. Note that the **EnableClientMusicOnHold** parameter is set to **FALSE**. Run the following command to set it to **TRUE**:

```
Set-CSClientPolicy Global -EnableClientMusicOnHold:$TRUE
```

But note that in case the phone and PC client are connected with same user, the Lync PC client setting is “stronger” than the phone setting (in case of collision).

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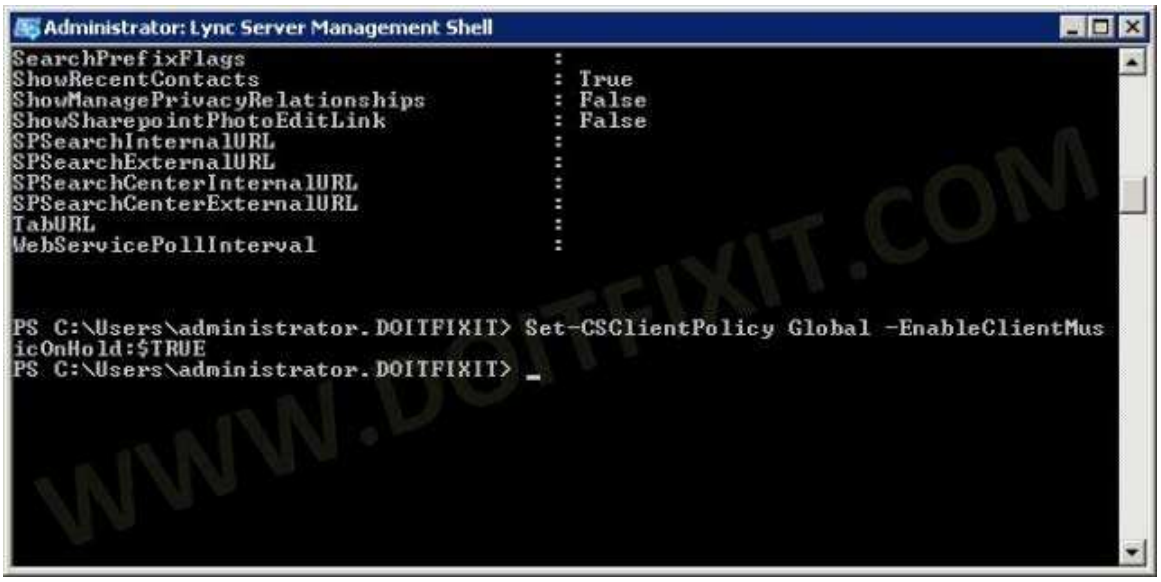

3. To prevent users from selecting or changing the music played on hold, run the following command defining the audio file:

```
Set-CSClientPolicy -EnableClientMusicOnHold:$TRUE -
MusicOnHoldAudioFile <Audio file Path>
```

➢ **To choose the music to be played on the IP phone:**

1. Open the ini configuration file in an editor like Notepad.
2. Configure the 'lync/moh/url' parameter with the required file transport (ftp,tftp,http). The format supported by the IP phone is:
   - WAV linear 16k 16 bit -OR-
   - WAV a/u law
3. Save and close the file and load it to the phone.

4.3 Configuring Timeout for 'Inactive' Status to change to 'Away'

IP managers can set the length of time it takes for the phone to change from 'Inactive' status to 'Away' status, using the lync/presence/state_change_timeout configuration file parameter.

Regardless of the parameter's value, it takes five minutes for the phone to change from 'Available' to 'Inactive' status.

4.4 Group Call Pickup (GCP)

GCP lets an employee take a call coming in on a colleague's phone, on their phone. If an employee in an open space hears a colleague's phone ringing and knows that colleague is unavailable, instead of having the call go unanswered and routed to Voice Mail, the call can be redirected and answered by the available employee. Only employees configured in the Lync server's GCP parameter can pick up the call.

To pre-configure Microsoft's Lync server for GCP capability, see:

http://technet.microsoft.com/en-us/library/jj945645.aspx

Refer to all subsections.

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4.5 Location

This feature enables the called party to identify the geographical location of the calling party. For example, if a caller in the U.S. makes an emergency call to E911, the feature extracts the caller's information for the police department to immediately identify the caller's location.

To enable users for E9-1-1:

http://technet.microsoft.com/en-us/library/gg425892.aspx

To define Location Policy in Microsoft's Lync server, see:

http://technet.microsoft.com/en-us/library/gg398962.aspx

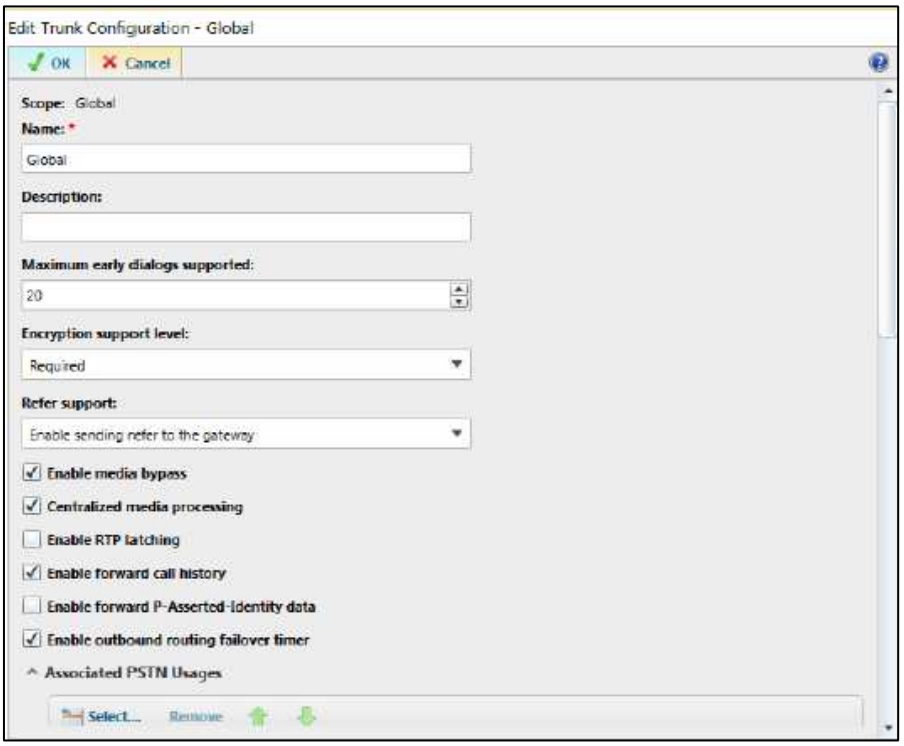
4.6 Configuring Microsoft Lync Server 2013 for SRTP / TLS

This section shows how to configure Microsoft Lync Server 2013 for Secure Real-Time Transport Protocol (SRTP) / TLS, if it isn't configured already.

➢ To configure Microsoft Lync Server 2013 for SRTP/TLS:

1. Open the Microsoft Lync Server 2013 management interface.
2. Configure a 'Route' on the Lync Server 2013.
3. Open the server's Edit Trunk Configuration – Global screen.

Figure 4-1: Microsoft Lync Server 2013 - Edit Trunk Configuration - Global



4. Select the **Enable media bypass** option.
5. Select one of the following options from the the 'Encryption Support Level' dropdown:
   - **Required** - SRTP encryption will be used to help protect traffic between the Mediation Server and the gateway or private branch exchange (PBX).
   - **Optional** - SRTP encryption will be used if the service provider or equipment manufacturer supports it.

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- **Not Supported -** SRTP encryption is not supported by the service provider or equipment manufacturer and will therefore not be used.

The option selected depends on customer configuration / requirements.

- If you set 'Encryption Support Level' to **Optional**, make sure the encryption is enabled in PowerShell (https://support.microsoft.com/en-us/kb/2761579):

```
Get-CsMediaConfiguration |Set-CsMediaConfiguration -
EncryptionLevel SupportEncryption
Identity            : Global
EnableQoS           : False
EncryptionLevel     : SupportEncryption
EnableSiren         : False
MaxVideoRateAllowed : VGA600K
```

4.7 Better Together over Ethernet

This section shows how to set up the Microsoft Lync feature 'Better Together over Ethernet' on AudioCodes' 400HD Series of IP Phones.

BToE enables operations to be mirrored on both AudioCodes' IP phone and the Lync client on the PC, so that these operations can be controlled from either the IP phone or the PC, whichever is convenient to the user at the time, for enhanced unified communications and optimized enterprise efficiency.

After your IP phone is paired with your Lync client, you can control (from phone or PC) operations such as answering incoming calls, making outgoing calls (click-to-dial), putting calls on hold and resuming them, and making conference calls (see the *User's Manual*).

4.7.1 Installing the BToE PC Application

This section shows how to install AudioCodes' BToE PC application.

➢ To install the BToE PC application:

1. After obtaining the installation file (the file name will be either *AudioCodes Better2Gether w.x.y.z.exe* or *AudioCodes Better2Gether w.x.y.z.msi*, for example, *AudioCodes Better2Gether 0.0.0.8.exe*), save it to your PC and then double-click it.

Note: If you install with the *exe*, then when upgrading you must use the *exe*. You cannot upgrade with the *msi* if you first installed with the *exe*, and vice versa.

The Prepare to Install screen opens showing preparation progress until the Welcome to the InstallShield Wizard screen opens:

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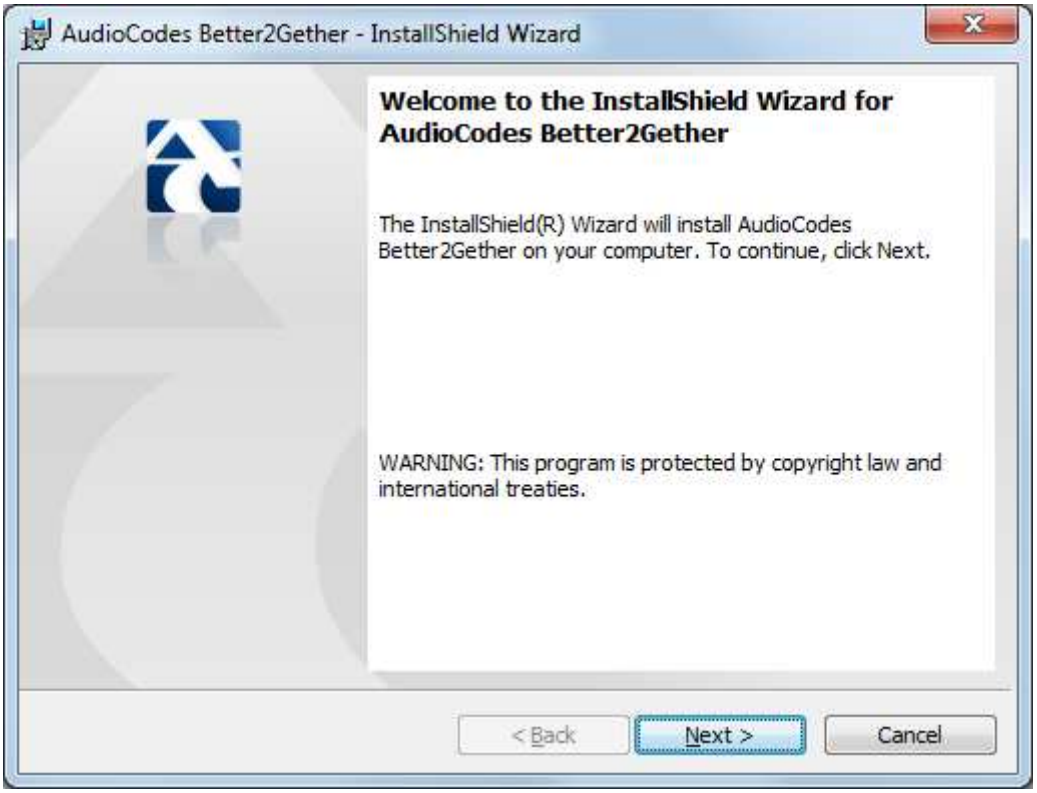
Figure 4-2: InstallShield Wizard – Preparing to Install

AudioCodes Better2Gether - InstallShield Wizard
Preparing to Install...
AudioCodes Better2Gether Setup is preparing the InstallShield Wizard, which will guide you through the program setup process. Please wait.
Extracting: AudioCodes Better2Gether.msi
Cancel

Figure 4-3: Welcome to the InstallShield Wizard


AudioCodes Better2Gether - InstallShield Wizard
Welcome to the InstallShield Wizard for AudioCodes Better2Gether
The InstallShield(R) Wizard will install AudioCodes Better2Gether on your computer. To continue, click Next.
WARNING: This program is protected by copyright law and international treaties.
< Back
Next >
Cancel

2. Click the **Next** button; the License Agreement screen opens.

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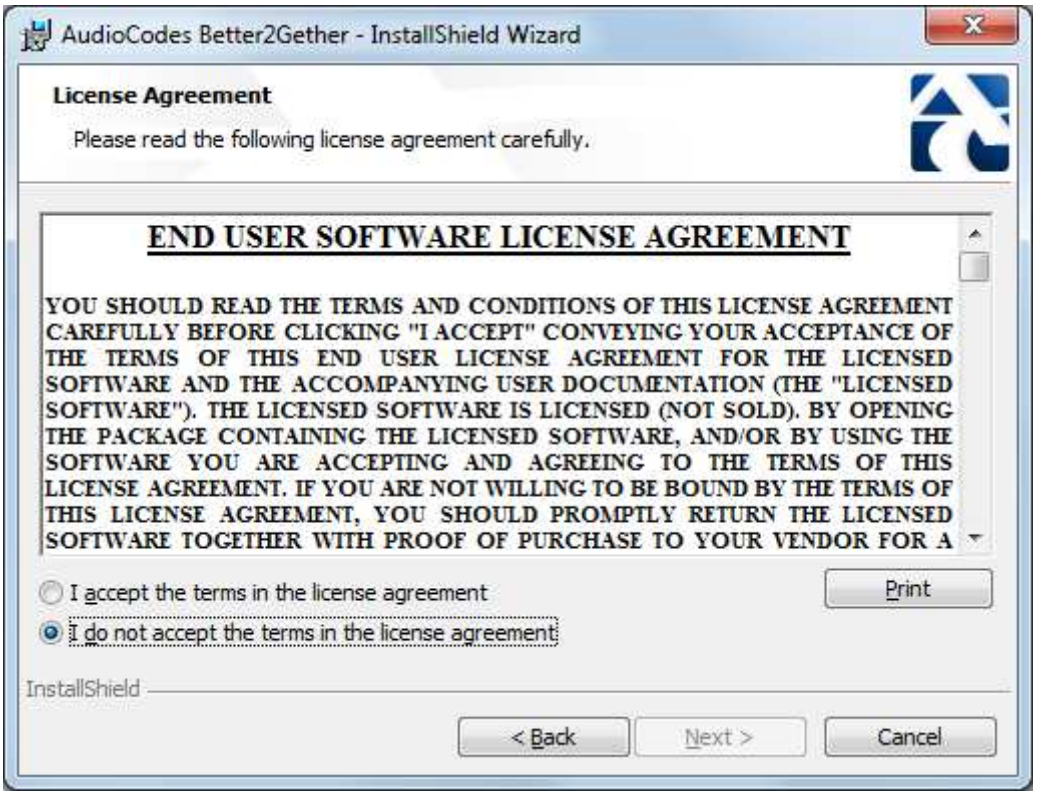
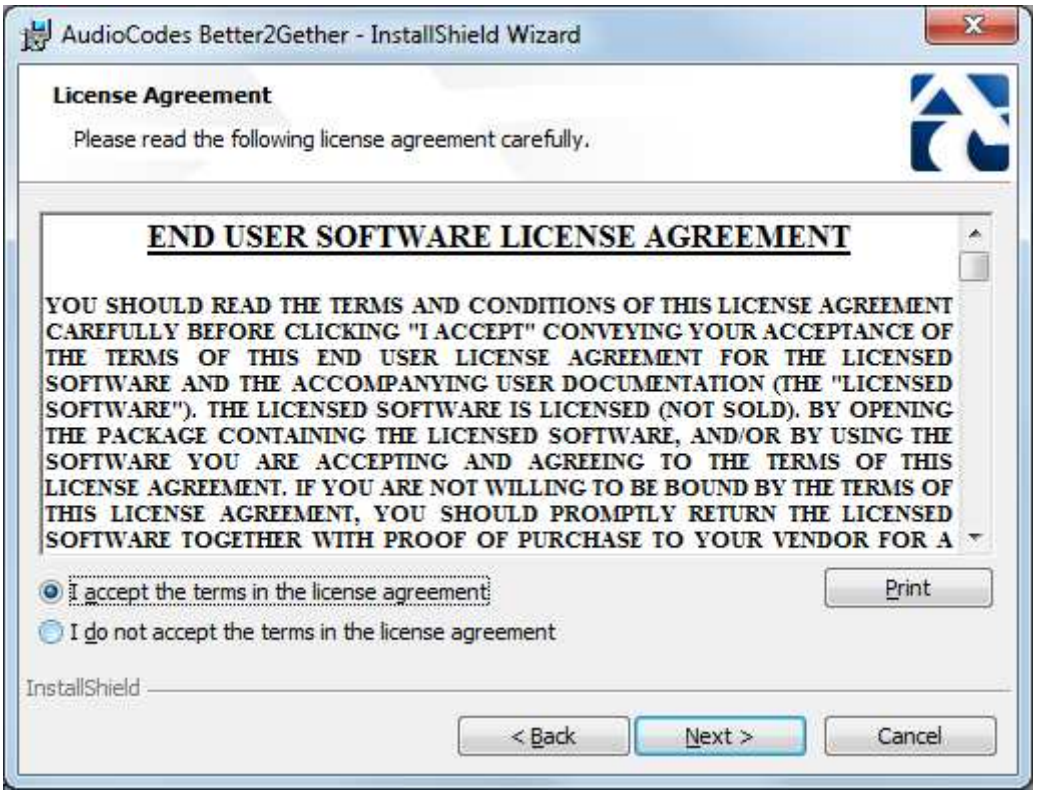
Figure 4-4: License Agreement


AudioCodes Better2Gether - InstallShield Wizard
License Agreement
Please read the following license agreement carefully.
END USER SOFTWARE LICENSE AGREEMENT
YOU SHOULD READ THE TERMS AND CONDITIONS OF THIS LICENSE AGREEMENT CAREFULLY BEFORE CLICKING "I ACCEPT" CONVEYING YOUR ACCEPTANCE OF THE TERMS OF THIS END USER LICENSE AGREEMENT FOR THE LICENSED SOFTWARE AND THE ACCOMPANYING USER DOCUMENTATION (THE "LICENSED SOFTWARE"). THE LICENSED SOFTWARE IS LICENSED (NOT SOLD). BY OPENING THE PACKAGE CONTAINING THE LICENSED SOFTWARE, AND/OR BY USING THE SOFTWARE YOU ARE ACCEPTING AND AGREEING TO THE TERMS OF THIS LICENSE AGREEMENT. IF YOU ARE NOT WILLING TO BE BOUND BY THE TERMS OF THIS LICENSE AGREEMENT, YOU SHOULD PROMPTLY RETURN THE LICENSED SOFTWARE TOGETHER WITH PROOF OF PURCHASE TO YOUR VENDOR FOR A
I accept the terms in the license agreement
I do not accept the terms in the license agreement
Print
InstallShield
< Back
Next >
Cancel

3. Select the **I accept…** option and click **Next**.

Figure 4-5: License Agreement


AudioCodes Better2Gether - InstallShield Wizard
License Agreement
Please read the following license agreement carefully.
END USER SOFTWARE LICENSE AGREEMENT
YOU SHOULD READ THE TERMS AND CONDITIONS OF THIS LICENSE AGREEMENT CAREFULLY BEFORE CLICKING "I ACCEPT" CONVEYING YOUR ACCEPTANCE OF THE TERMS OF THIS END USER LICENSE AGREEMENT FOR THE LICENSED SOFTWARE AND THE ACCOMPANYING USER DOCUMENTATION (THE "LICENSED SOFTWARE"). THE LICENSED SOFTWARE IS LICENSED (NOT SOLD). BY OPENING THE PACKAGE CONTAINING THE LICENSED SOFTWARE, AND/OR BY USING THE SOFTWARE YOU ARE ACCEPTING AND AGREEING TO THE TERMS OF THIS LICENSE AGREEMENT. IF YOU ARE NOT WILLING TO BE BOUND BY THE TERMS OF THIS LICENSE AGREEMENT, YOU SHOULD PROMPTLY RETURN THE LICENSED SOFTWARE TOGETHER WITH PROOF OF PURCHASE TO YOUR VENDOR FOR A
I accept the terms in the license agreement
I do not accept the terms in the license agreement
Print
InstallShield
< Back
Next >
Cancel

4. Click **Next**; the Destination Folder screen opens.

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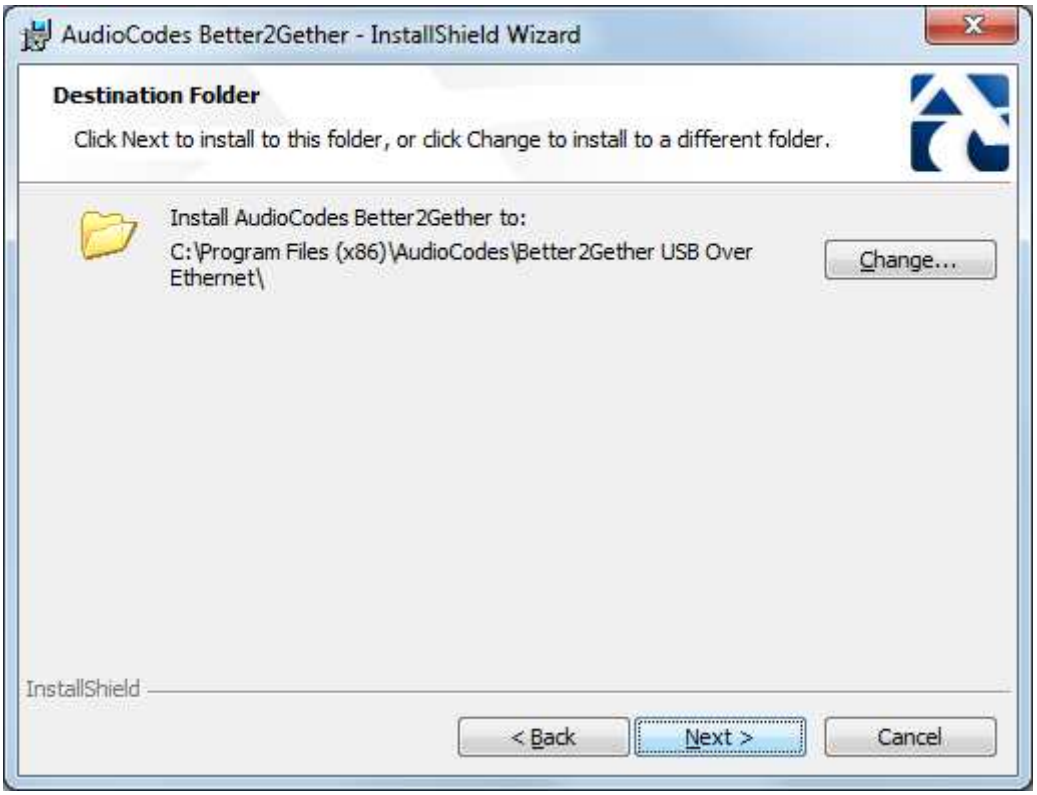
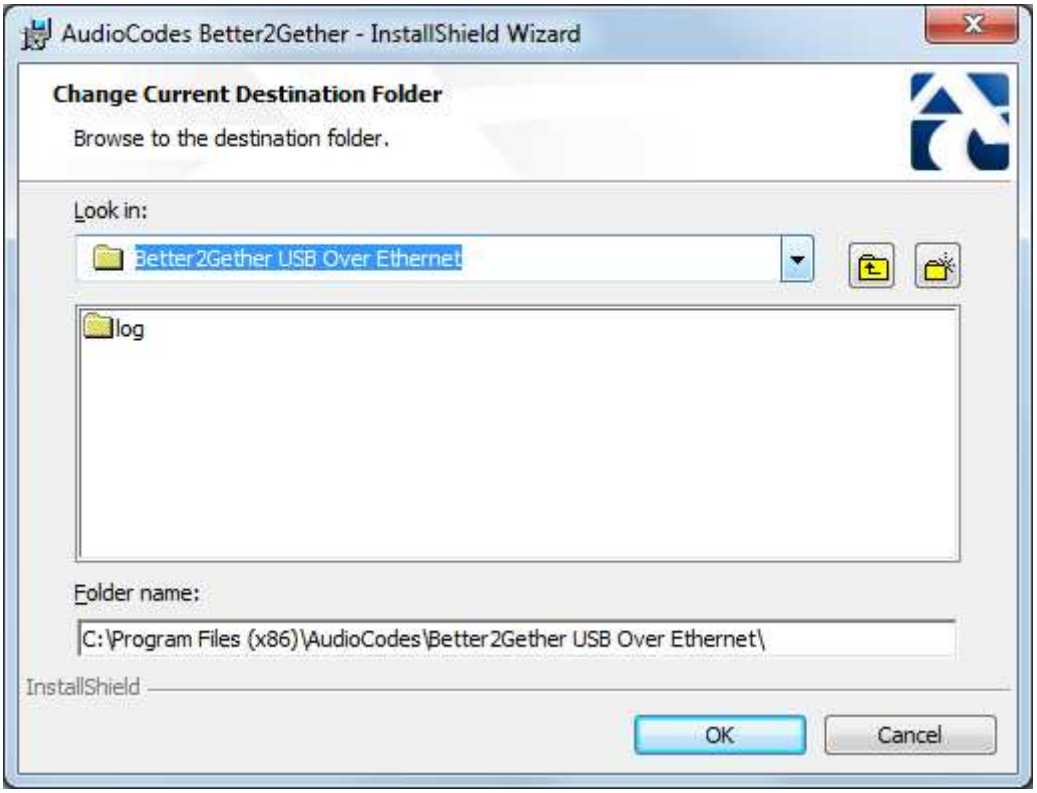
Figure 4-6: Destination Folder


AudioCodes Better2Gether - InstallShield Wizard
Destination Folder
Click Next to install to this folder, or click Change to install to a different folder.
Install AudioCodes Better2Gether to:
C:\Program Files (x86)\AudioCodes\Better2Gether USB Over Ethernet\
Change...
InstallShield
< Back
Next >
Cancel

5. To change the default Destination Folder, click **Change** and proceed to step 6. To leave the Destination Folder at its default, click **Next** and proceed to step 7.

Figure 4-7: Change Current Destination Folder



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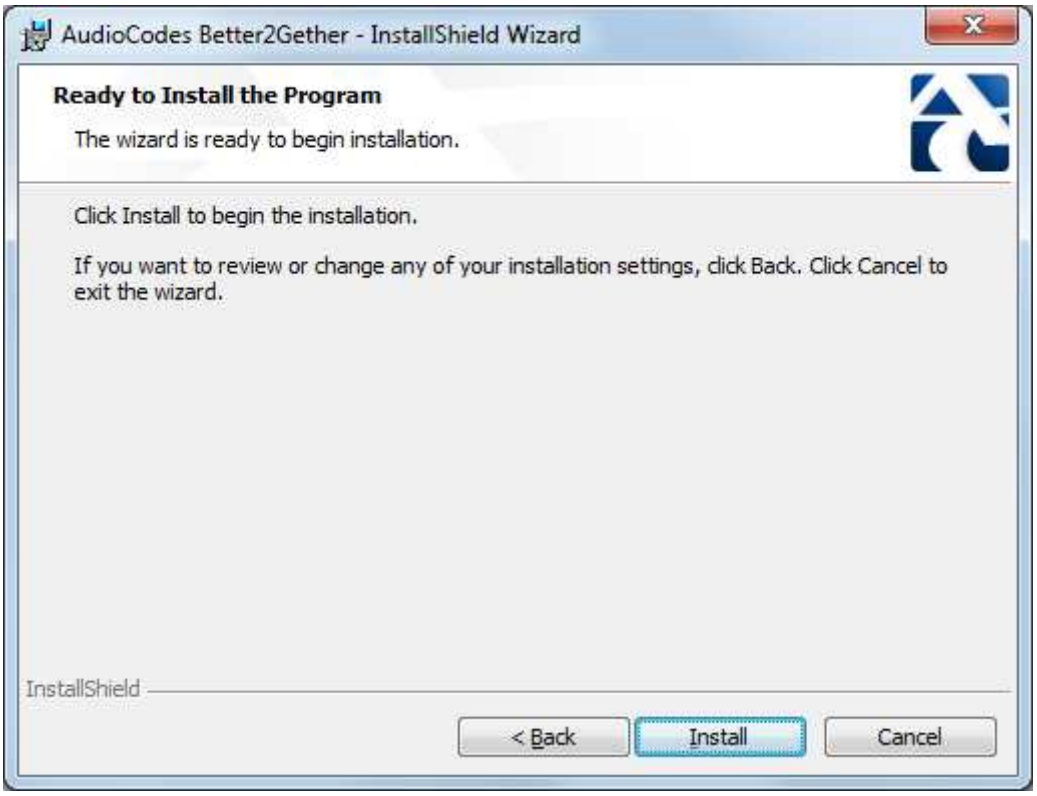
6. Click **OK**; you're returned to the Destination Folder screen.
7. Click **Next**; the Ready to Install screen opens.

Figure 4-8: Ready to Install


AudioCodes Better2Gether - InstallShield Wizard
Ready to Install the Program
The wizard is ready to begin installation.
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
InstallShield
< Back
Install
Cancel

8. Click the **Install** button; the Installing AudioCodes Better2Gether screen opens indicating installation progress status.

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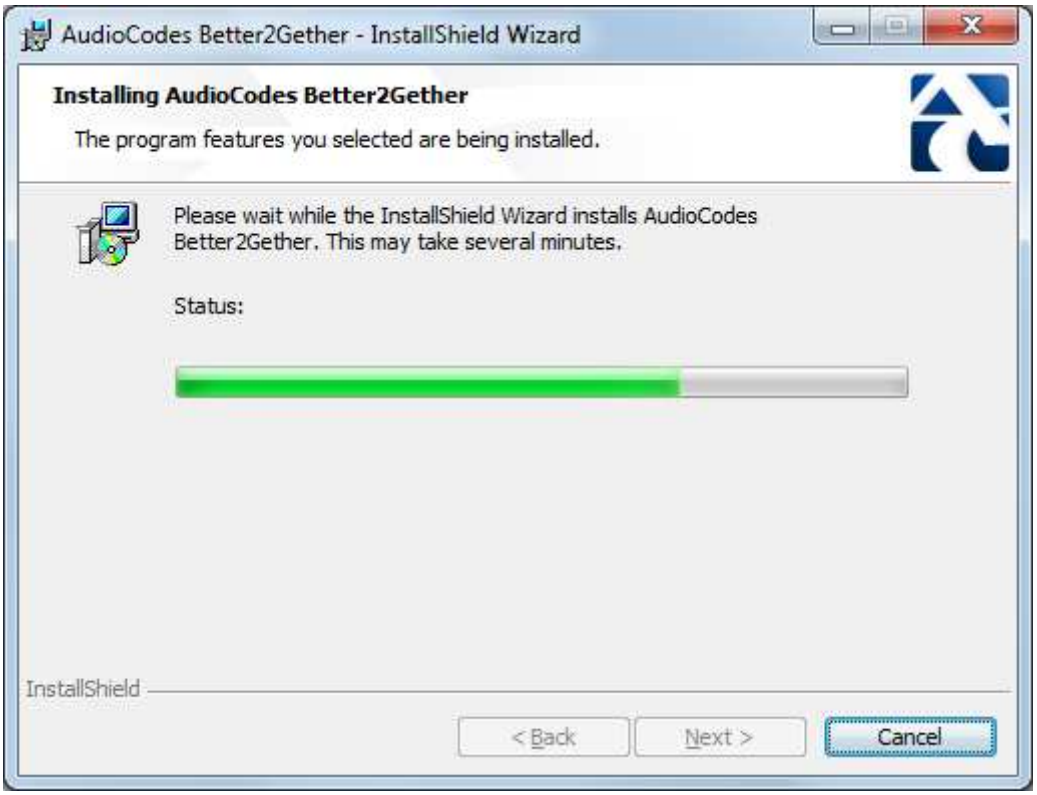
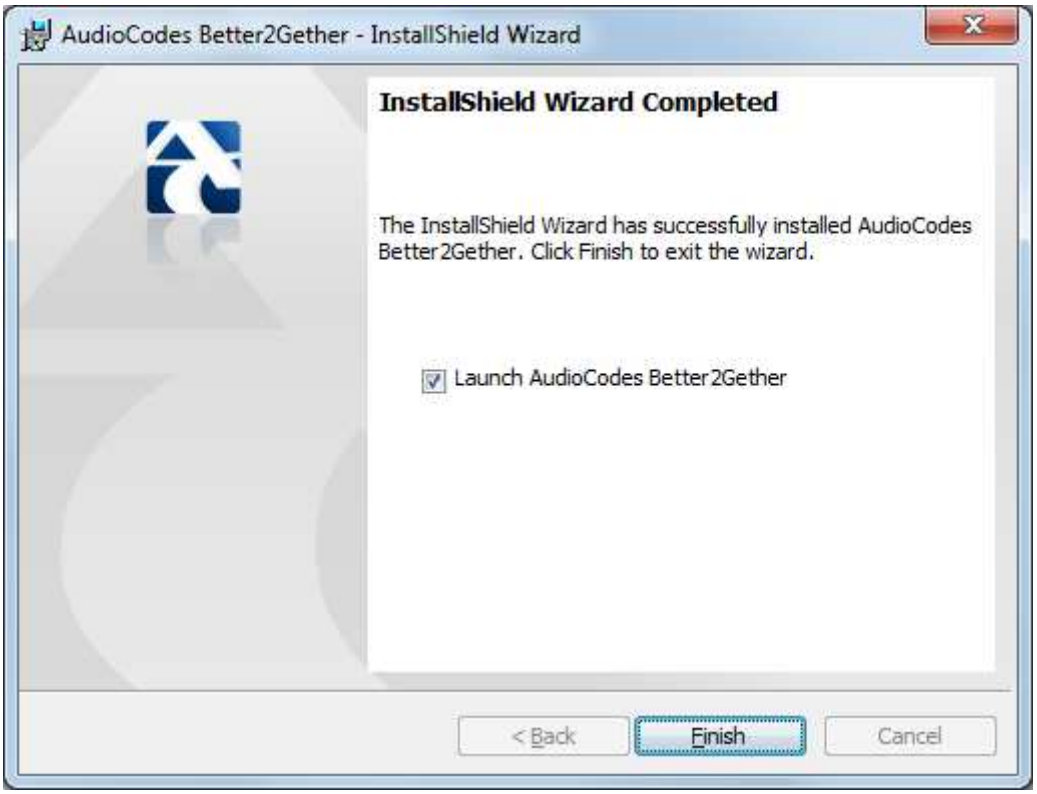
Figure 4-9: Installing AudioCodes Better2Gether


AudioCodes Better2Gether - InstallShield Wizard
Installing AudioCodes Better2Gether
The program features you selected are being installed.
Please wait while the InstallShield Wizard installs AudioCodes Better2Gether. This may take several minutes.
Status:
InstallShield
< Back
Next >
Cancel

9. Wait until the following screen is displayed:

Figure 4-10: InstallShielf Wizard Completed


AudioCodes Better2Gether - InstallShield Wizard
InstallShield Wizard Completed
The InstallShield Wizard has successfully installed AudioCodes Better2Gether. Click Finish to exit the wizard.
Launch AudioCodes Better2Gether
< Back
Finish
Cancel

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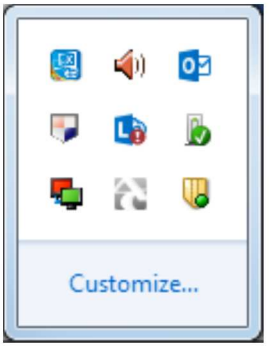
10. Click the **Finish** button and then check your Windows taskbar and locate the newly displayed AudioCodes icon (AC) as shown below:

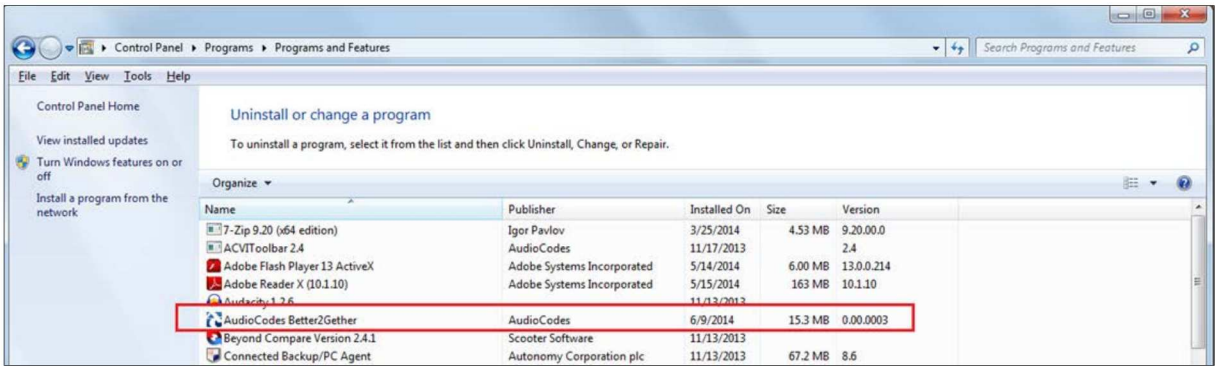
Figure 4-11: AudioCodes Icon in Taskbar



11. Wait until the "Installing device driver software" process completes:

12. Check your programs in the Control Panel > Programs. You should see:

Figure 4-12: Control Panel>Programs>AudioCodes Better2Gether


Control Panel ▸ Programs ▸ Programs and Features
Search Programs and Features
File Edit View Tools Help
Control Panel Home
View installed updates
Turn Windows features on or off
Install a program from the network
Uninstall or change a program
To uninstall a program, select it from the list and then click Uninstall, Change, or Repair.
Organize
Name Publisher Installed On Size Version
7-Zip 9.20 (x64 edition) Igor Pavlov 3/25/2014 4.53 MB 9.20.00.0
ACVIToolbar 2.4 AudioCodes 11/17/2013 2.4
Adobe Flash Player 13 ActiveX Adobe Systems Incorporated 5/14/2014 6.00 MB 13.0.0.214
Adobe Reader X (10.1.10) Adobe Systems Incorporated 5/15/2014 163 MB 10.1.10
AudioCodes Better2Gether AudioCodes 6/9/2014 15.3 MB 0.00.0003
Beyond Compare Version 2.4.1 Scooter Software 11/13/2013
Connected Backup/PC Agent Autonomy Corporation plc 11/13/2013 67.2 MB 8.6

Note: You can use this entry in the Control Panel > Programs to uninstall.

13. Access Computer Management > Services and Applications and locate BToE:

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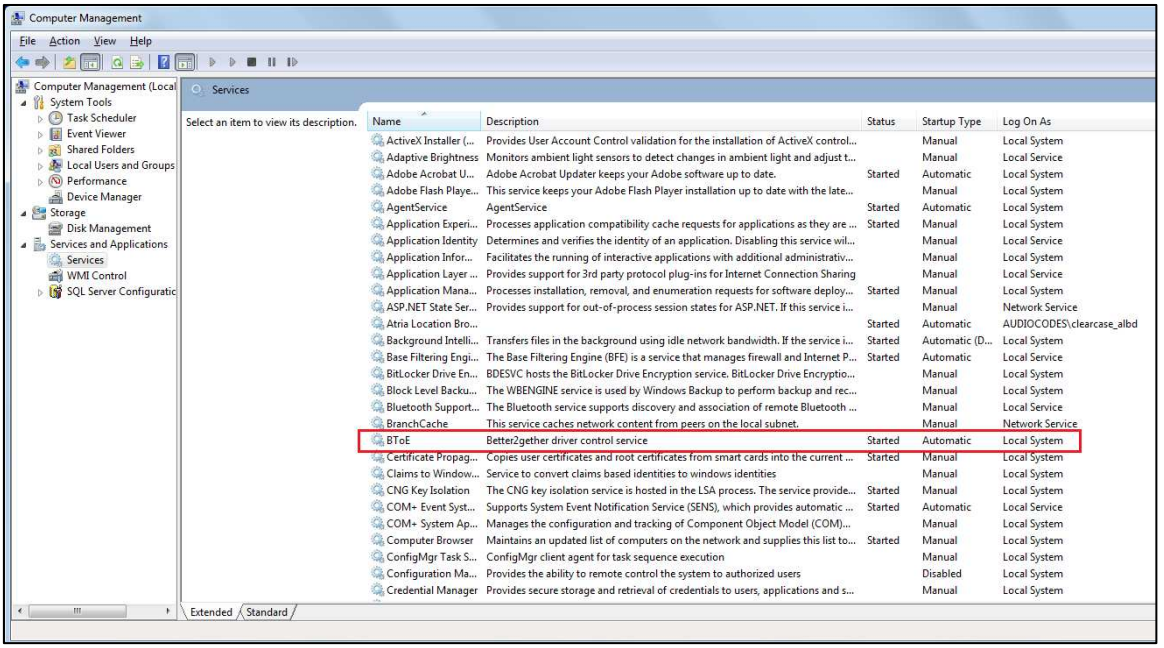
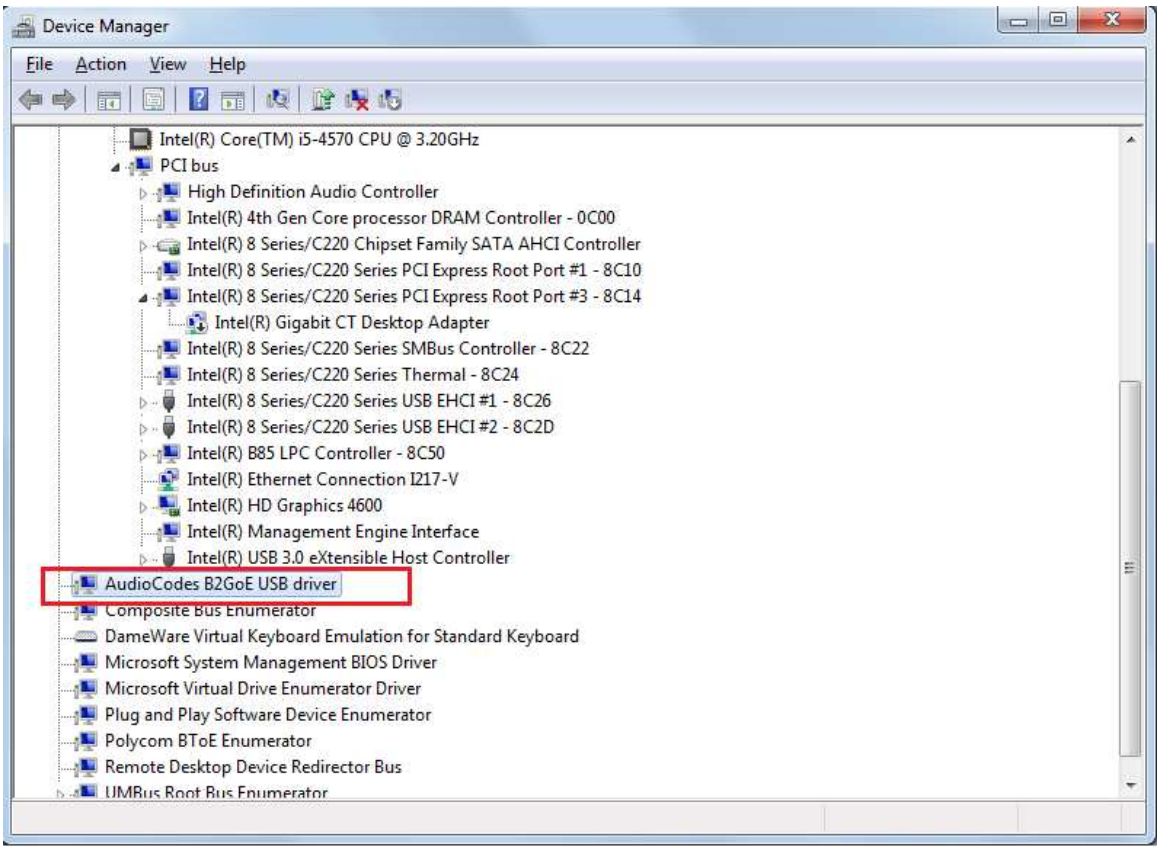
Figure 4-13: Computer Management > Services and Applications


Computer Management
File Action View Help
Computer Management (Local
System Tools
Task Scheduler
Event Viewer
Shared Folders
Local Users and Groups
Performance
Device Manager
Storage
Disk Management
Services and Applications
Services
WMI Control
SQL Server Configuratic
Services
Select an item to view its description.
Name
Description
Status
Startup Type
Log On As
ActiveX Installer (... Provides User Account Control validation for the installation of ActiveX control... Manual Local System
Adaptive Brightness Monitors ambient light sensors to detect changes in ambient light and adjust t... Manual Local Service
Adobe Acrobat U... Adobe Acrobat Updater keeps your Adobe software up to date. Started Automatic Local System
Adobe Flash Playe... This service keeps your Adobe Flash Player installation up to date with the late... Manual Local System
AgentService AgentService Started Automatic Local System
Application Experi... Processes application compatibility cache requests for applications as they are ... Started Manual Local System
Application Identity Determines and verifies the identity of an application. Disabling this service wil... Manual Local Service
Application Infor... Facilitates the running of interactive applications with additional administrativ... Manual Local System
Application Layer ... Provides support for 3rd party protocol plug-ins for Internet Connection Sharing Manual Local Service
Application Mana... Processes installation, removal, and enumeration requests for software deploy... Started Manual Local System
ASP.NET State Ser... Provides support for out-of-process session states for ASP.NET. If this service i... Manual Network Service
Atria Location Bro... Started Automatic AUDIOCODES\clearcase_albd
Background Intelli... Transfers files in the background using idle network bandwidth. If the service i... Started Automatic (D... Local System
Base Filtering Engi... The Base Filtering Engine (BFE) is a service that manages firewall and Internet P... Started Automatic Local Service
BitLocker Drive En... BDESVC hosts the BitLocker Drive Encryption service. BitLocker Drive Encryptio... Manual Local System
Block Level Backu... The WBENGINE service is used by Windows Backup to perform backup and rec... Manual Local System
Bluetooth Support... The Bluetooth service supports discovery and association of remote Bluetooth ... Manual Local Service
BranchCache This service caches network content from peers on the local subnet. Manual Network Service
BToE Better2gether driver control service Started Automatic Local System
Certificate Propag... Copies user certificates and root certificates from smart cards into the current ... Started Manual Local System
Claims to Window... Service to convert claims based identities to windows identities Manual Local System
CNG Key Isolation The CNG key isolation service is hosted in the LSA process. The service provide... Started Manual Local System
COM+ Event Syst... Supports System Event Notification Service (SENS), which provides automatic ... Started Automatic Local Service
COM+ System Ap... Manages the configuration and tracking of Component Object Model (COM)... Manual Local System
Computer Browser Maintains an updated list of computers on the network and supplies this list to... Started Manual Local System
ConfigMgr Task S... ConfigMgr client agent for task sequence execution Manual Local System
Configuration Ma... Provides the ability to remote control the system to authorized users Disabled Local System
Credential Manager Provides secure storage and retrieval of credentials to users, applications and s... Manual Local System
Extended
Standard

14. Access the Device Manager and locate 'AudioCodes B2GoE USB driver'.

Figure 4-14: Device Manager > AudioCodes B2GoE USB Driver


Device Manager
File Action View Help
Intel(R) Core(TM) i5-4570 CPU @ 3.20GHz
PCI bus
High Definition Audio Controller
Intel(R) 4th Gen Core processor DRAM Controller - 0C00
Intel(R) 8 Series/C220 Chipset Family SATA AHCI Controller
Intel(R) 8 Series/C220 Series PCI Express Root Port #1 - 8C10
Intel(R) 8 Series/C220 Series PCI Express Root Port #3 - 8C14
Intel(R) Gigabit CT Desktop Adapter
Intel(R) 8 Series/C220 Series SMBus Controller - 8C22
Intel(R) 8 Series/C220 Series Thermal - 8C24
Intel(R) 8 Series/C220 Series USB EHCI #1 - 8C26
Intel(R) 8 Series/C220 Series USB EHCI #2 - 8C2D
Intel(R) B85 LPC Controller - 8C50
Intel(R) Ethernet Connection I217-V
Intel(R) HD Graphics 4600
Intel(R) Management Engine Interface
Intel(R) USB 3.0 eXtensible Host Controller
AudioCodes B2GoE USB driver
Composite Bus Enumerator
DameWare Virtual Keyboard Emulation for Standard Keyboard
Microsoft System Management BIOS Driver
Microsoft Virtual Drive Enumerator Driver
Plug and Play Software Device Enumerator
Polycom BToE Enumerator
Remote Desktop Device Redirector Bus
UMBus Root Bus Enumerator

You've successfully installed the program.

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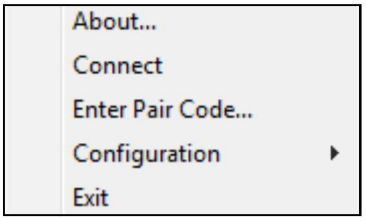
4.7.2 Making Sure BToE is Correctly Installed

This section shows how to make sure Better Together over Ethernet is correctly installed.

➢ To make sure BToE is correctly installed:

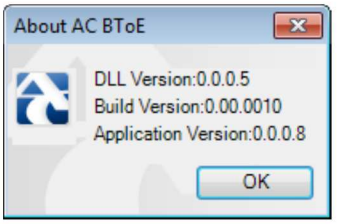
1. Click the **AC** (AudioCodes) taskbar icon; the following menu pops up:

Figure 4-15: Popup Menu



2. Select the **About…** menu option to verify the DLL and BToE version:

Figure 4-16: About AC BToE



4.7.3 Configuring the BToE TCP Port

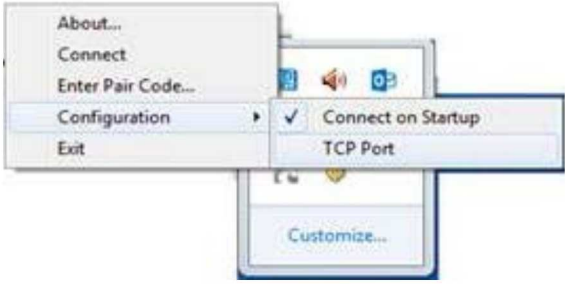
You can opt to configure a different BToE TCP port to the default 9999, depending on the requirements of your enterprise. For example, you may decide to change the BToE TCP port to 5000 because your enterprise is using the default port of 9999, and 5000 is available. This feature therefore provides enterprise administrators with more freedom in network administration.

Note: If you decide to change the default BToE TCP port, you must update *both* the PC *and* the IP phone with the new BToE TCP port number.

➢ To change the BToE TCP port on the PC side:

1. Click the **AC** (AudioCodes) taskbar icon; the menu shown in Figure 4-15 pops up.
2. Select **Disconnect** in the popup menu and then select **Configuration** > **TCP Port**.

Figure 4-17: TCP Port



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3. From the AC BTOE TCP Port dialog that opens, configure the TCP Port:

Figure 4-18: AC BToE TCP Port

The valid range is 1 to 65535.

➢ **To change the BToE TCP port on the IP phone side:**

- In the Configuration File, change the 'lync/BToE/TcpPortNumber' parameter. For example, **lync/BToE/TcpPortNumber=5000**.

4.7.4 Pairing the BToE PC Application with the IP Phone

This section shows how to pair AudioCodes' BToE PC application with the IP phone using a pair code. Pair like this:

1. Generate a pair code (see Section 4.7.4.1)
2. Connect the IP phone and BToE PC application using the pair code (see Section 4.7.4.2)

Note:

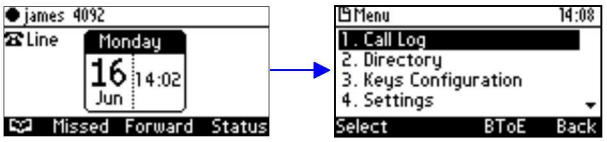
- In case of IP change you will need to generate pair code again.
- If you know the last pair code you do not need to generate a new one. If you don't know it continue below.

4.7.4.1 Generating a Pair Code

This section shows how to generate a pair code.

➢ **To generate a pair code:**

1. On the IP phone, press the **MENU** key; the LCD displays the Menu screen.



2. Press the **BToE** softkey; the BToE pair code is displayed:

This is the pair code that will be used by the BToE PC application. Make a note of it for reference when connecting the IP phone with the BToE PC application.

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4.7.4.2 Connecting the IP Phone with the BToE PC Application

This section shows how to connect the IP phone with the BToE PC application.

➢ **To connect the two:**

1. Open the AudioCodes BToE Connect screen: click the BToE client icon placed on your taskbar after installation, and then from the popup menu that opens, select the **Enter Pair Code** option.

Figure 4-19: AudioCodes BToE Client

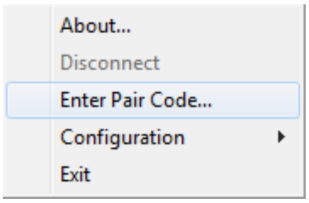
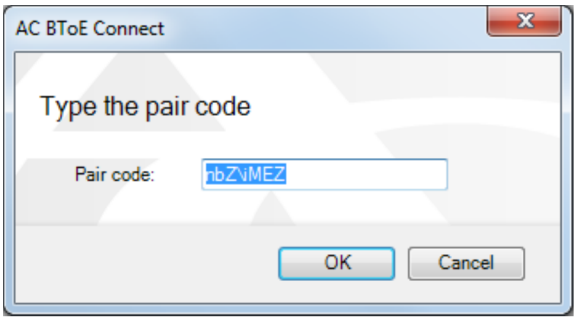


Figure 4-20: Enter Pair Code

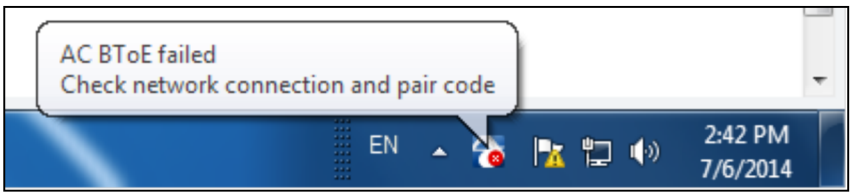


2. In the 'Type the pair code' screen, enter the pair code that you generated as shown in Section 4.7.4.1; the **OK** button is activated after 8 characters are entered.
3. Click the **OK** button; the application connects.

Note: The phone may restart twice when upgrading to the BToE version.
See the *Release Notes*.

4. If a communication error occurs or the wrong pair code was entered, the following icon indication appears:

Figure 4-21: AC BToE Failed Indication



5. When BToE is successfully connected, view the following icon indication:

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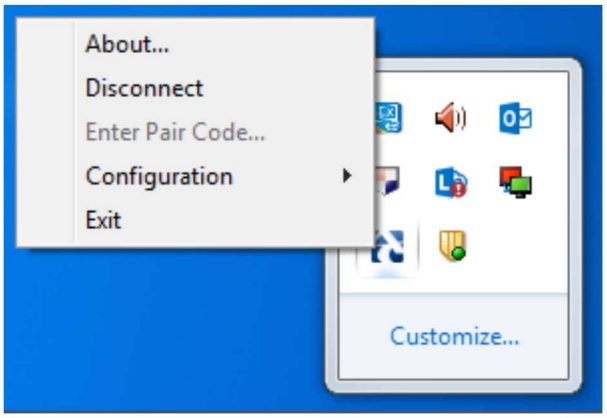
Figure 4-22: AC BToE is Connected Indication

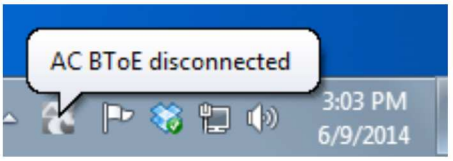
6. When BToE is in 'Connected' state, the popup menu shows the **Disconnect** menu item and the **Enter Pair Code** menu item is deactivated.

Figure 4-23: Popup Menu – 'Disconnect' Enabled, 'Enter Pair Code…' Disabled



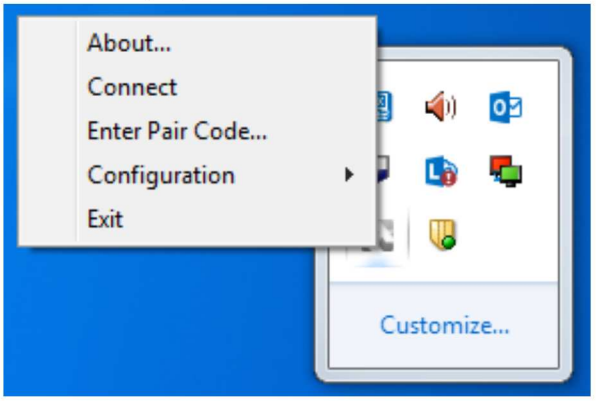
7. After selecting the **Disconnect** menu option, the 'AC BToE Disconnected' indication is displayed:

Figure 4-24: AC BToE Disconnected



8. From the popup menu you can see if BTOE is disconnected.

Figure 4-25: Popup Menu When BToE is Disconnected



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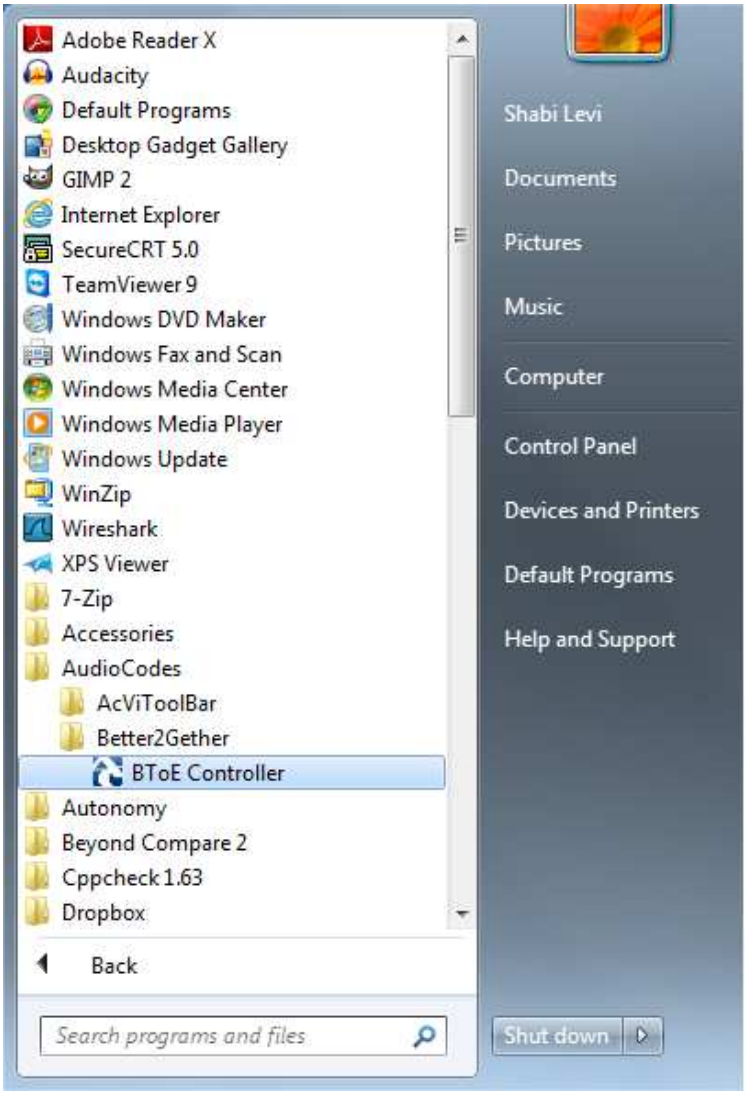
9. Use the table below as reference when determining BToE's connection state from the taskbar icon.

Taskbar Icon	BToE's connection state
	BToE is connected
	BToE is disconnected
	BToE is connected but a failure is preventing a correct connection. The failure can be a network problem or the wrong pair code was defined.

10. From the click popup menu, you can select the **Exit** option; the BToE PC application stops. You can activate the application again from the Start menu as shown in Figure 4-26.

Figure 4-26: Start > Programs > AudioCodes > BToE Controller



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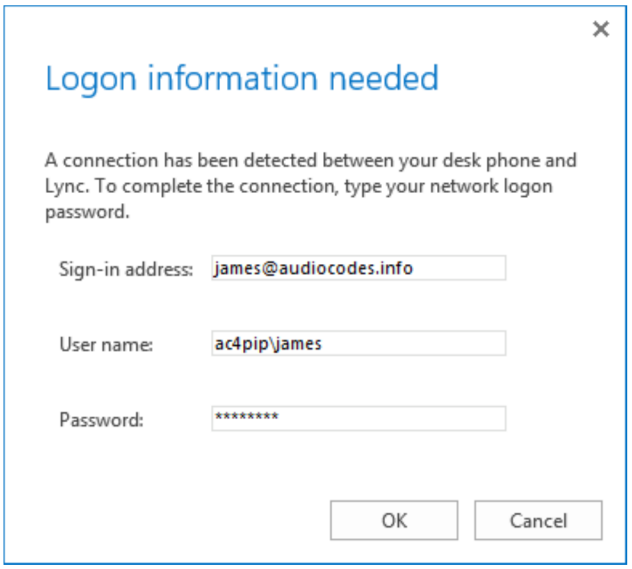
4.7.5 Connecting the Lync Client with the IP Phone

This section shows how to connect the Microsoft Lync client with the IP phone using the Lync login screen.

➢ To connect the two:

- Enter your credentials in the Lync Sign-in request prompt, and click **OK**.

Figure 4-27: Lync Sign-in Request Prompt



Note: Primary Device cannot be changed in Lync PC client during a call. When the phone is in idle mode (not in a call), the PC application must be disconnected in order to change Primary Device. See the *Release Notes*.

4.7.6 Making Sure IP Phone/Lync Client are Paired

This section shows how to make sure you successfully paired your IP phone with the Lync client.

4.7.6.1 Making Sure Lync Client is Paired

You can make sure the Lync client is paired with the IP phone.

➢ To make sure the Lync client is paired with the IP phone:

1. In the Lync application, in the lowermost left corner of the screen, click the Select Primary Device icon ; the following popup menu opens:

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2. Make sure **Handset AudioCodes 400HD Phone** is selected.

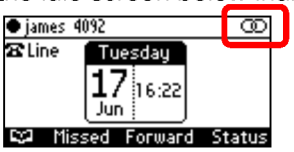
Note:

- When answering an incoming *video* call with a paired phone, the call is established. The default device is the PC speaker/microphone rather than the phone. Subsequent audio calls will be unaffected; the paired phone will still be the default device.
- In pairing mode, the user (Lync PC client /phone) can perform up to two concurrent calls (incoming/outgoing). See the *Release Notes*.

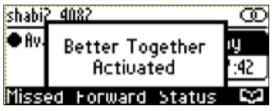
4.7.6.2 Making Sure the IP Phone is Paired

You can determine from the IP phone's idle screen if the phone is paired with the Lync client. The idle screen below indicates the phone is not paired:

The two interlocked rings in the idle screen below indicates the phone is paired.



After connecting, 'BToE Activated' pops up, and then disappears; the two interlocked rings remain.



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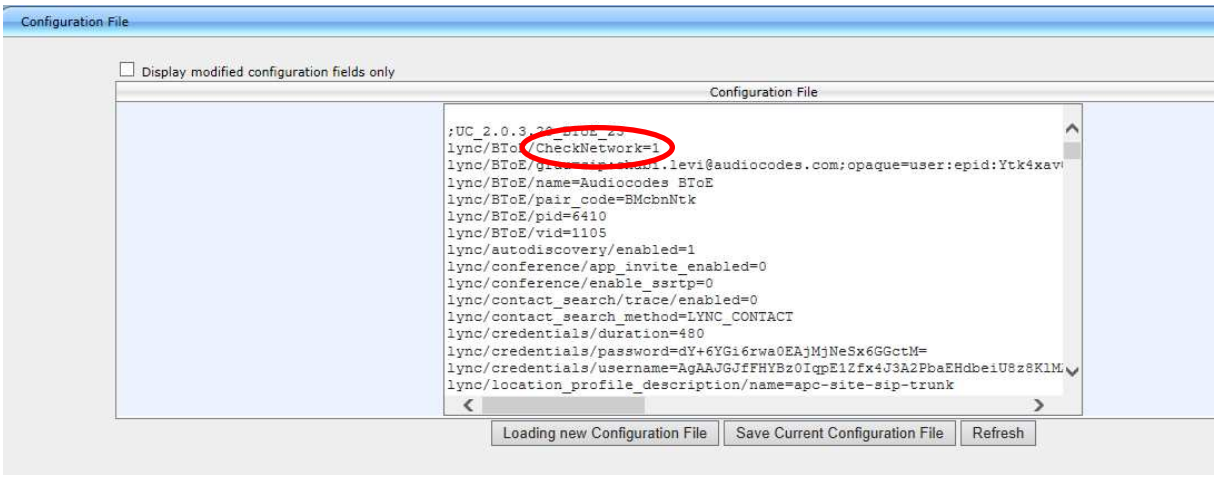
4.7.7 Pairing Across Different Subnets

Pairing across different subnets is enabled by default. The 'lync/BToE/CheckNetwork=0' field in the configuration file enables it.

➢ To make sure pairing across different subnets is enabled:

1. In the Web interface, access the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**).

Figure 4-28: Web Interface - Configuration File



2. Locate the 'CheckNetwork' field. Make sure it is set to its default of **0**.

   0 = pairing across different subnets enabled
   1 = pairing across different subnets disabled

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4.8 Boss Admin

This section shows how to configure a delegate (admin). Each phone can support up to five bosses or admins. One boss can have up to five admins. One admin can have up to five bosses. A many-to-many configuration is also supported. Admins are configured on the boss's phone. For information on the feature's functions, see the *User's Manual*.

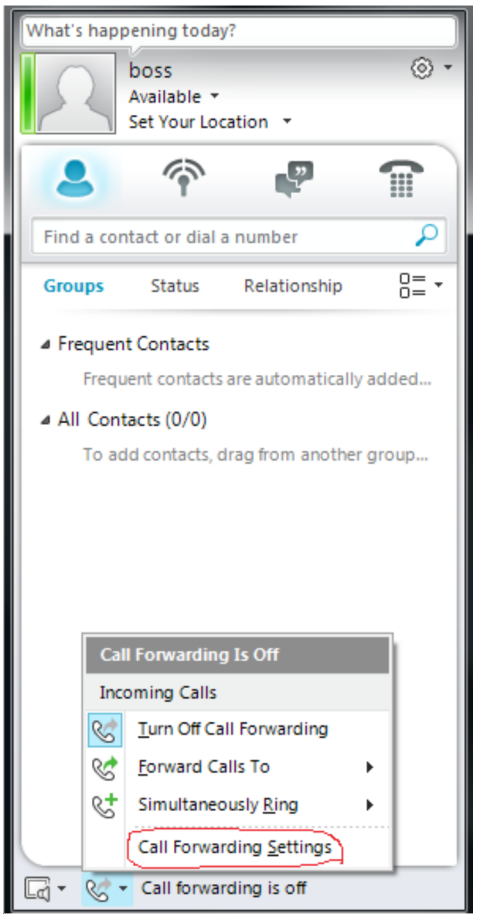
Note:

- The Boss Admin feature applies only to the 430HD and 440HD IP phone models.
- Make sure your environment allows delegation for the user. If it doesn't, configuration will not work. All users must be allowed to configure all users as delegates.
- To remove an Admin, the Boss must remove the Admin in the 'Call Forwarding – Delegates' screen (open the Lync client > click **Call Forward Settings** > click **Edit my delegate members >** select the Admin > click **Remove**). It's not enough to turn off call forwarding.

➢ To configure an admin:

1. In the boss's Lync client, click the handset icon and from the menu that opens, choose the **Call Forwarding Settings** option, as shown in Figure 4-29.

Figure 4-29: Lync Client – Call Forwarding Settings



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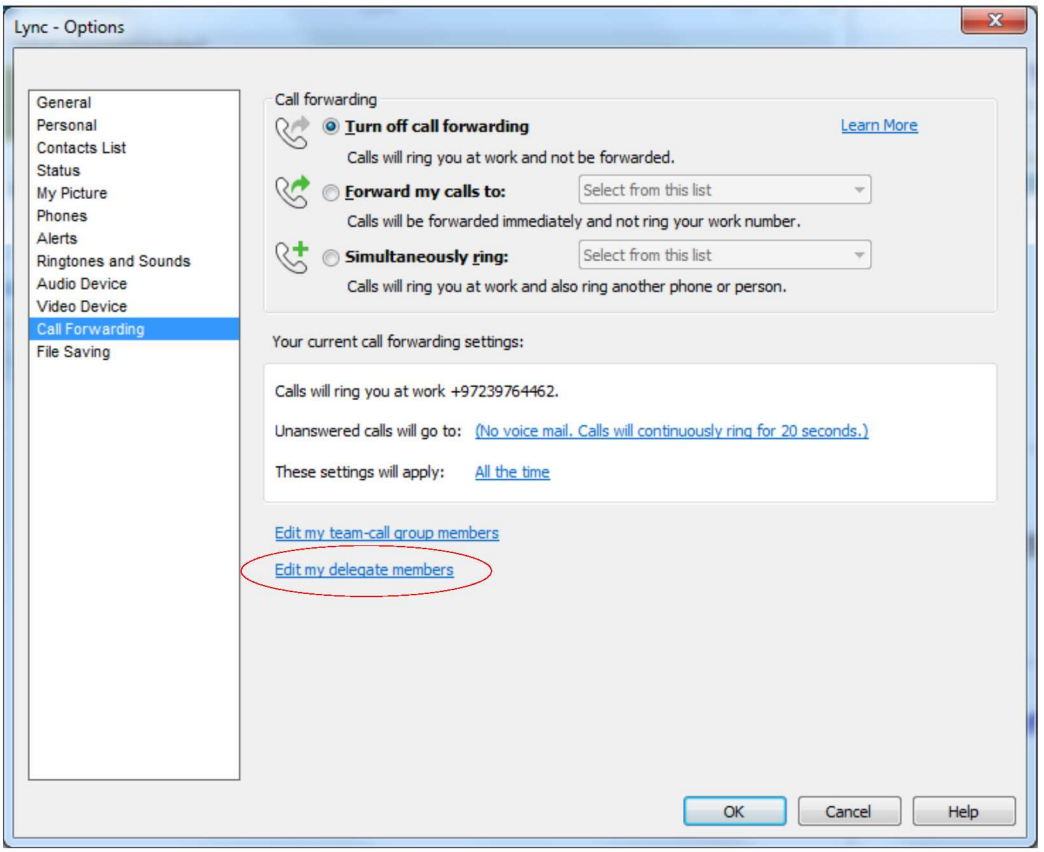
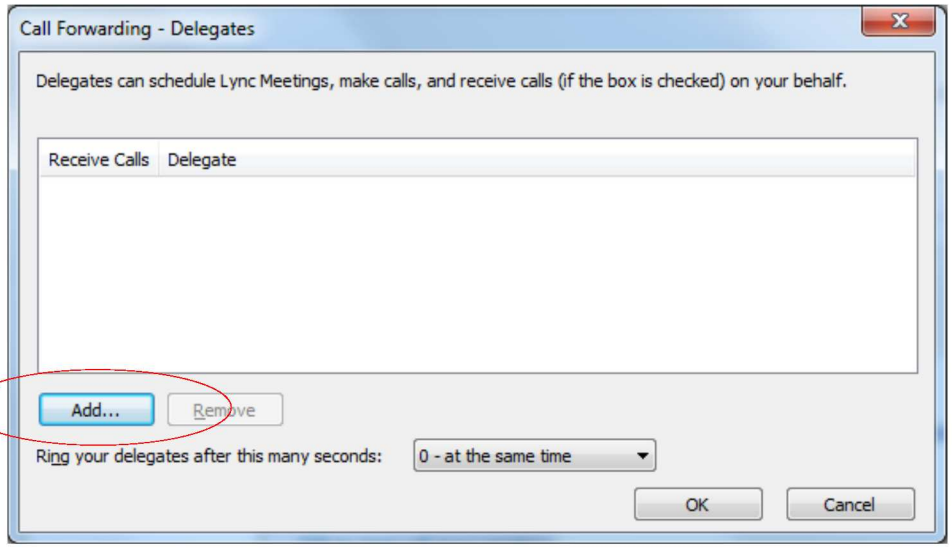
2. In the screen that opens, shown below, click the **Edit my delegate members** link.

Figure 4-30: Lync Client - Edit my delegate members



3. In the screen that opens, shown below, click **Add** and add a contact from the list.

Figure 4-31: Lync Client – Call Forwarding – Add Delegates


Call Forwarding - Delegates
Delegates can schedule Lync Meetings, make calls, and receive calls (if the box is checked) on your behalf.
Receive Calls
Delegate
Add...
Remove
Ring your delegates after this many seconds:
0 - at the same time
OK
Cancel

4. Adjacent to the added delegate in the screen that opens (Mike Dubb, shown below), select the **Receive Calls** option:

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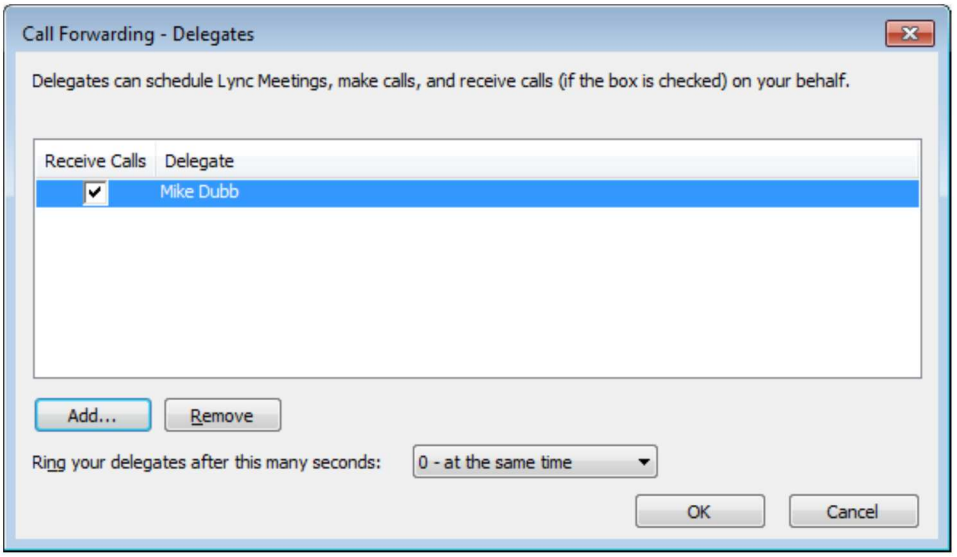
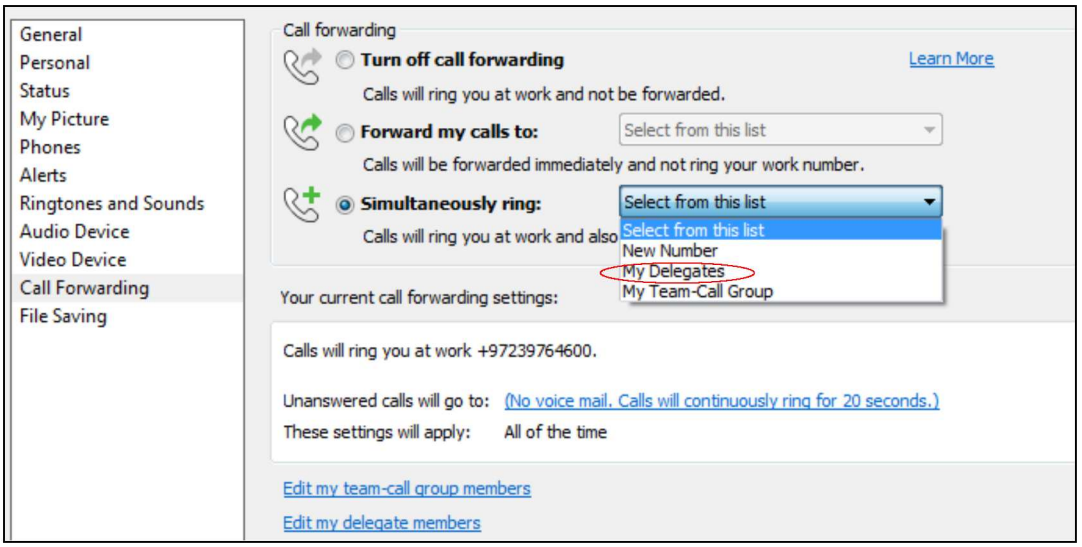
Figure 4-32: Lync Client – Call Forwarding – Added Delegate - Receive Calls


Call Forwarding - Delegates
Delegates can schedule Lync Meetings, make calls, and receive calls (if the box is checked) on your behalf.
Receive Calls
Delegate
Mike Dubb
Add...
Remove
Ring your delegates after this many seconds:
0 - at the same time
OK
Cancel

5. Click **OK**.
6. Select the **Simultaneously ring** option and configure it to **My Delegates**.

Figure 4-33: Lync Client – Call Forwarding – Simultaneously ring - My Delegates



7. Click **OK**; you're returned to the Lync client main screen.

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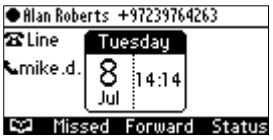
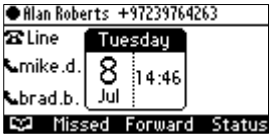
4.8.1 Viewing Admin Lines on the Boss's Phone

After setting up the feature, you'll view on the boss's phone (**Alan Roberts**, below) the admin line **mike.d.** that you configured previously.



- Configure another admin in the same way as that described previously.
- On the boss's phone, view both configured admin lines **mike.d.** and **brad.b.**



4.8.2 Viewing the Boss's Line on the Admin's Phone

- On the admin's phone (**Mike Dubb** below), you'll view the boss's line **Alan R** from whose Lync client you configured the admin:

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5 Maintenance

This section shows how to upgrade the phone firmware, perform administration tasks, and enable remote management.

Note:

- To manage Automatic Provisioning, see Section 4.6 on page 85.
- To manage Configuration File Manual Update, see Section 2.2 on page 19.

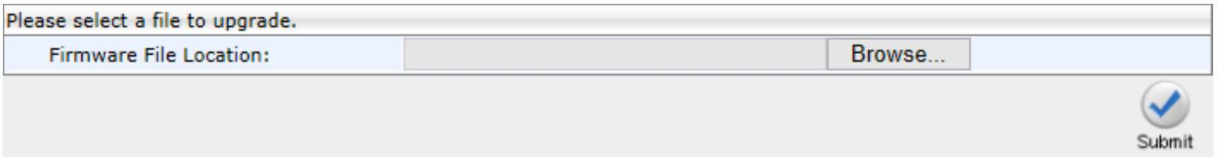
5.1 Upgrading Phone Firmware

This section shows how to upgrade the phone firmware.

➢ To upgrade the phone firmware:

1. After receiving the new img firmware file from AudioCodes, save it to a location on your PC.
2. Open the 'Manual firmware upgrade' page (**Management** tab > **Manual Update** > **Manual firmware upgrade**).

Figure 5-1: Manual Firmware Upgrade



3. Click **Browse...**, navigate to the img file on your PC, and then click **Submit**; the phone LCD displays the upgrade process (see the *User's Manual* for details).
4. On the phone, press the **MENU** key and select **Status** > **Firmware Version**.

5. Make sure that the firmware is the version of the img file you received from AudioCodes, applicable to the phone model.

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5.2 Administration

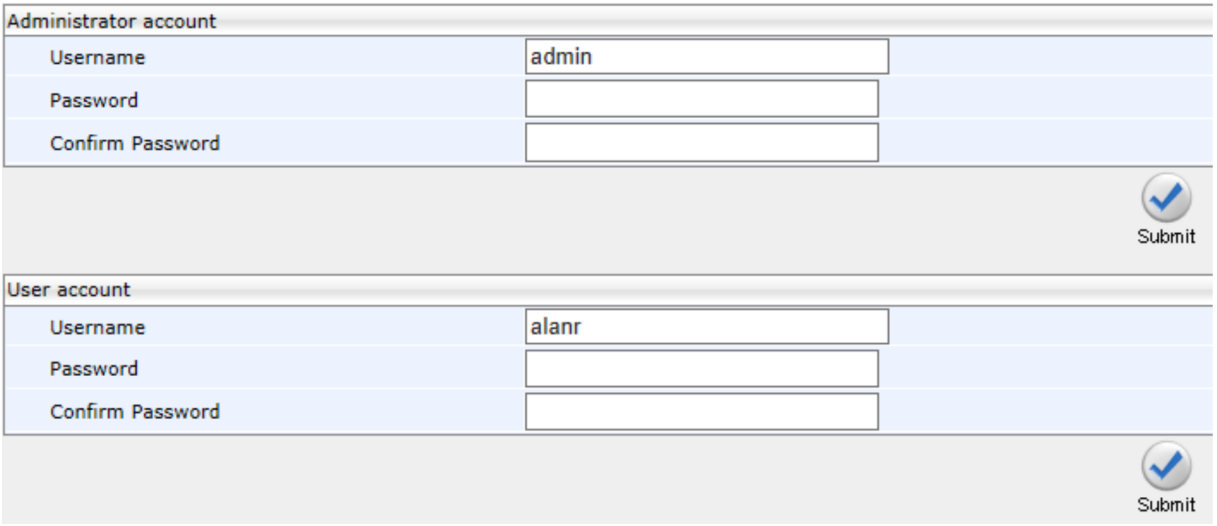
5.2.1 Managing Users

You can change the phone's login user name and password. This is the login required to access the Web interface and the **Administration** menu in the phone's LCD.

➢ **To change the login username and password using the Web interface:**

1. Open the Users page (**Management** tab > **Administration** menu > **Users**).

Figure 5-2: Web Interface – Users



2. In the 'Username' field, enter a user name. Use the table below as reference.
3. In the 'Password' field, enter a new password, and then in the 'Confirm Password' field, re-enter this new password. Use the table below as reference.

Note:

- For the Administrator account, the default 'Username' and 'Password' is **admin** and **1234** respectively.
- For the User account, the default 'Username' and 'Password' is **user** and **1234** respectively.

4. Click **Submit**; a confirmation box appears.
5. Click **OK**.

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➢ **To change the login username and password using the Configuration File:**

- Use the tables below as reference.

Table 5-1: Administrator account - Username and Password

Parameter	Description
Note: To add a value to these parameters, enter **system/** followed by the parameter name, equal sign and then the value (e.g. `system/user_name=admin`).	
Username **[system/user_name]**	The phone user name. The default value is admin. If this parameter value is unconfigured in the configuration file, users can log in to the Web interface using the same Microsoft password/PIN they used to sign in to the IP phone (to maintain backward compatibility). **Note:** This parameter is applicable only to the Web and Telnet interfaces.
Password **[system/password]**	The encrypted phone password. The default value is 1234. If this parameter value is unconfigured in the configuration file, users can log in to the Web interface using the same Microsoft password/PIN they used to sign in to the IP phone (to maintain backward compatibility). To generate an encrypted password, see Section 3.4 on page 59. **Note:** This parameter applies to the Web and Telnet interfaces, and to the LCD display.

Table 5-2: User account - Username and Password

Parameter	Description
[system/web_user_name]	The phone user name. Default: user. Applies only to Web and Telnet interfaces.
[system/web_user_password]	The encrypted phone password. Default: 1234. Applies only to Web and Telnet interfaces, and LCD.

5.2.2 Restoring Defaults

See Section 8.7.1.2 on page 128, under General Corrective Actions.

5.2.3 Restarting the Phone

See Section 8.7.4.2 on page 130, under General Corrective Actions.

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5.3 Enabling Remote Management

5.3.1 Enabling Telnet Access

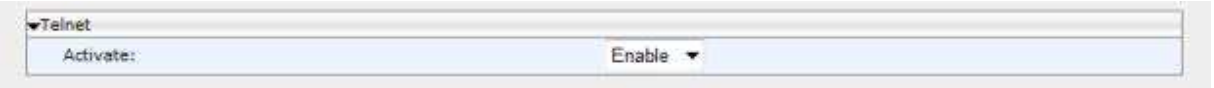
Telnet access can be enabled using the Web interface or the Configuration File.

Note: Opening a Telnet connection in an external network is strongly inadvisable due to the widely recognized vulnerability of the protocol.

➢ To enable Telnet using the Web interface:

1. Open the Telnet page (**Management** tab > **Remote Management** menu > **Telnet**).

Figure 5-3: Web Interface - Telnet



2. Enable Telnet according to the parameter in the table below, and then click **Submit**.

➢ To configure Telnet using the Configuration File:

1. Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**).
2. Configure the parameter using the table below as reference.

Table 5-3: Telnet Parameters

Parameter	Description
Note: To add a value to these parameters, enter **management/** followed by the parameter name, equal sign and then the value (e.g. `management/telnet/enabled=0`).	
Activate **[management/telnet/enabled]**	Enables telnet access to the phone. ▪ **[0]** Disable (default) ▪ **[1]** Enable The user name and password for telnet access are according to the parameters: **system/user_name** and **system/password**.

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6 Status and Performance

6.1 Viewing Network Status

This section shows how to view network status from the Web interface.

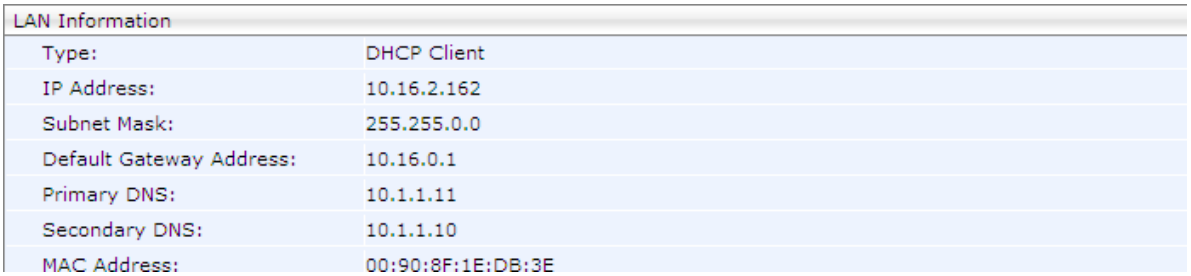
6.1.1 Viewing LAN Status

This section shows how to view LAN status information.

➢ **To view LAN status information:**

- Open the Network Status page (**Status & Diagnostics** tab > **System Status** menu > **Network Status**).

Figure 6-1: Web Interface - LAN Information



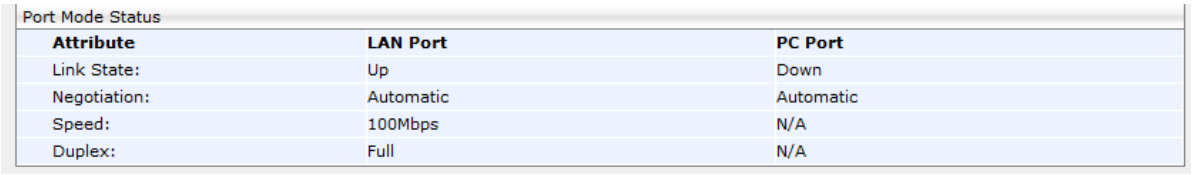
6.1.2 Viewing Port Mode Status

This section shows how to view the Port Mode status.

➢ **To view port mode status:**

- Open the Network Status page (**Status & Diagnostics** tab > **System Status** menu > **Network Status**).

Figure 6-2: Web Interface - Port Mode Status



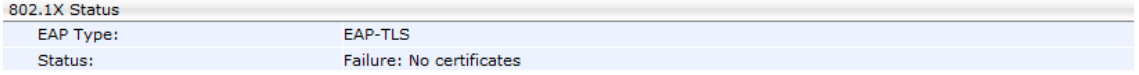
6.1.3 Viewing 802.1X Status

This section shows how to view 802.1X status.

➢ **To view 802.1X status:**

- Open the Network Status page (**Status & Diagnostics** tab > **System Status** menu > **Network Status**).

Figure 6-3: Web Interface - 802.1X Status



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6.2 Viewing VoIP Status

This section shows how to view VoIP status using the Web interface.

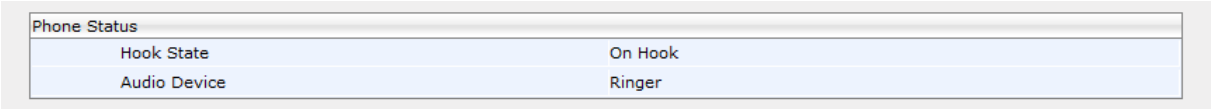
6.2.1 Viewing Phone Status

This section shows how to view the phone status.

➢ **To view the phone status:**

- Open the Network Status page (**Status & Diagnostics** tab > **System Status** menu > **VoIP Status**).

Figure 6-4: Web Interface - Phone Status



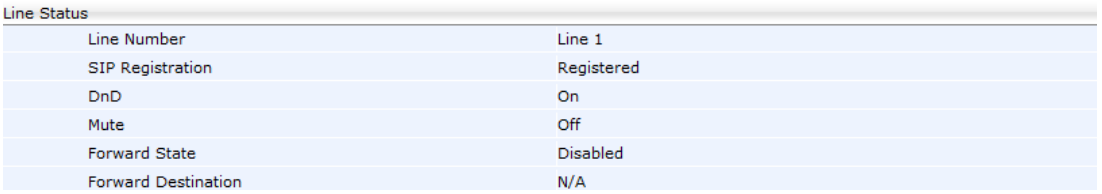
6.2.2 Viewing Line Status

This section describes how to view the line status.

➢ **To view the line status:**

- Open the Network Status page (**Status & Diagnostics** tab > **System Status** menu > **VoIP Status**).

Figure 6-5: Web Interface - Line Status



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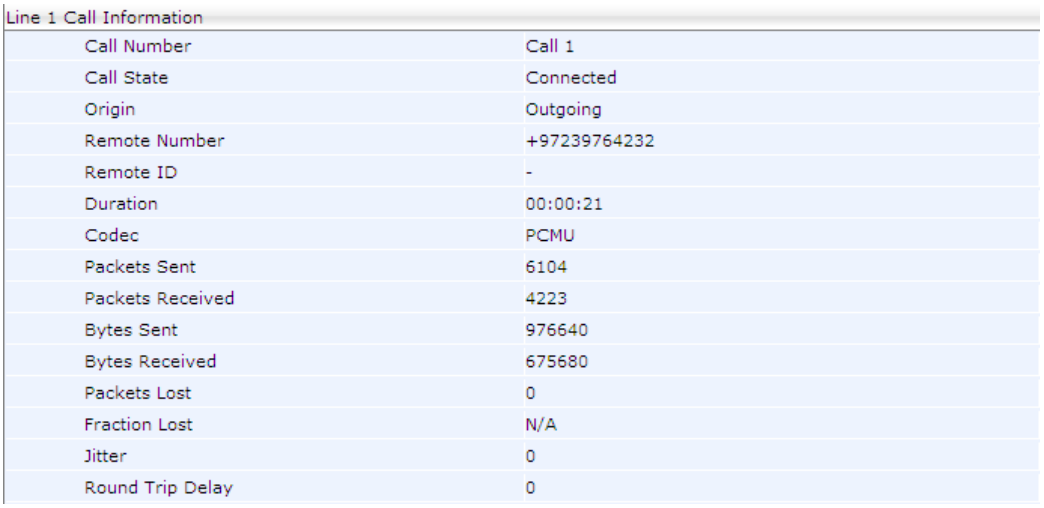
6.2.3 Viewing Call Information

The Web interface displays call information *of a currently established call*.

➢ **To view call information after establishing a call:**

- Open the Network Status page (**Status & Diagnostics** tab > **System Status** menu > **VoIP Status**).

Figure 6-6: Web Interface - Call Information



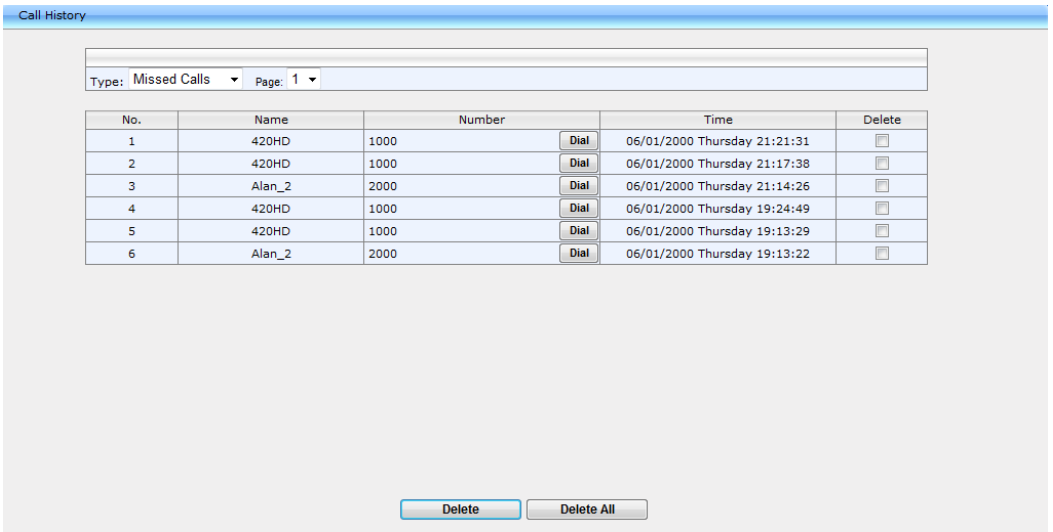
6.3 Viewing Call History

The Web interface displays received and missed calls, dialed numbers and call duration.

➢ **To view calls history:**

1. Open the Call History page (**Status & Diagnostics** tab > **History** > **Call History**).

Figure 6-7: Web Interface - Call History



2. From the 'Type' drop-down list, select the type of call history (i.e., missed calls, received calls, and dialed numbers) that you want to view; the table lists the call history according to the chosen call history type.
3. To delete an entry, select the entry's 'Delete' option and click the **Delete** button.

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6.4 Viewing Phone Model / Firmware Version

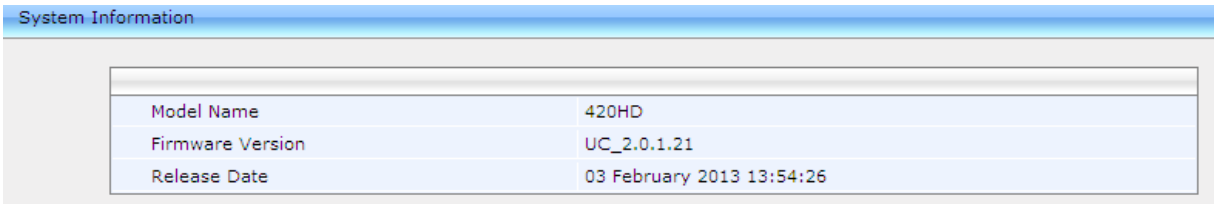
This section shows how to view the phone model and the phone's firmware version from the Web interface or from the phone's LCD.

6.4.1 Viewing from the Web Interface

➢ **To view the phone's model and firmware version from the Web interface:**

- Open the phone's Web interface; the System Information page opens by default:

Figure 6-8: Web Interface - System Information



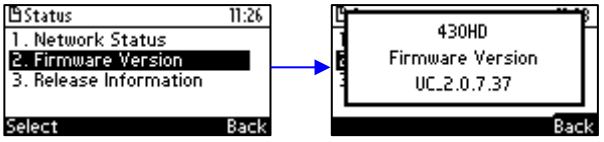
To access the page from another page in the Web interface:
Status & Diagnostics tab > **System Information** menu > **General**

6.4.2 Viewing from the Phone's LCD

This section shows how to view phone model and firmware version from the phone's LCD.

➢ **To view the phone's model and firmware version from the LCD:**

- Open the Firmware Version screen (**MENU** key > **Status** menu > **Firmware Version**).



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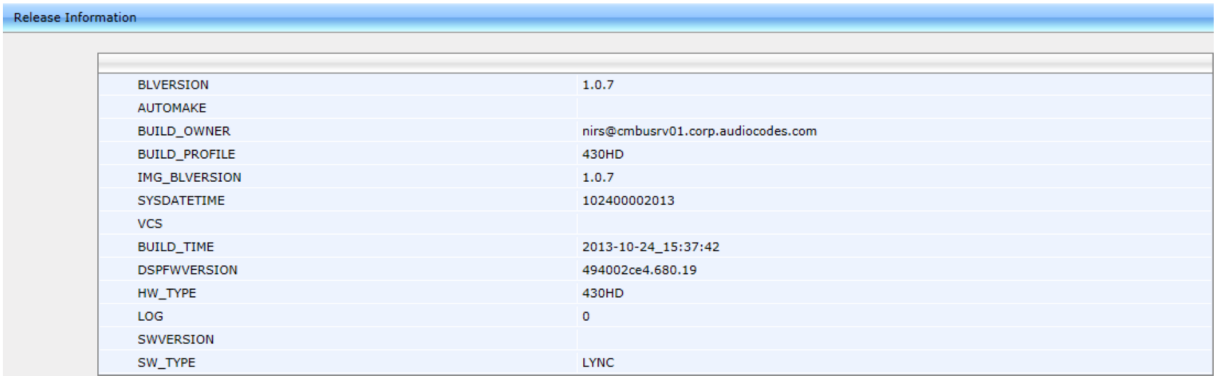
6.4.3 Viewing Release Information

This section shows how to view release information in the Web interface.

➢ To view release information in the Web interface:

- Open the Release Information screen (**Status & Diagnostics** tab > **System Information** > **Release Information**).

Figure 6-9: Web Interface - System Information - Release Information



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7 Diagnostics

This section shows how to perform diagnostics.

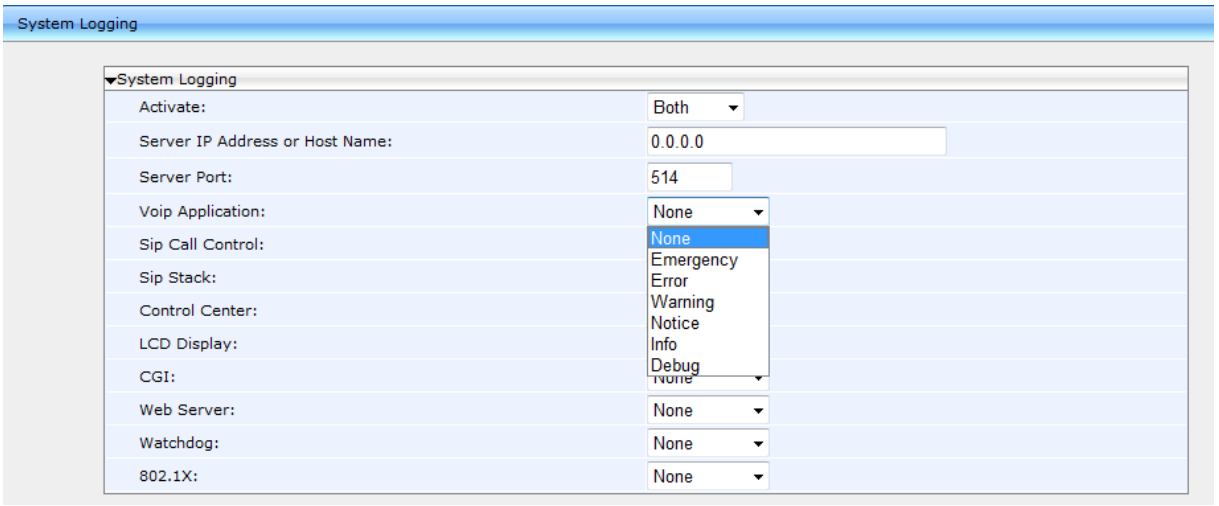
7.1 Logging: Analyzing and Debugging Traffic using Syslog

This section shows how to use the System Logging (Syslog) feature for traffic analysis and debugging. The feature can be configured using the Web interface or Configuration File.

➢ To configure system logging using the Web interface:

1. Open the System Logging page (**Status & Diagnostics** tab > **Diagnostics** menu > **Logging**).

Figure 7-1: Web Interface - System Logging



2. Configure the parameters using the table below as reference and click **Submit**.

➢ To configure system logging using the Configuration File:

- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and configure the parameters using the table below as reference.

Table 7-1: Syslog Parameters

Parameter	Description
Note: To add a value to these parameters, enter **system/** followed by the parameter name, equal sign and then the value (e.g. system/syslog/mode=UDP).	
Activate **[system/watchdog/enabled]**	Enables the system watchdog. Possible values are: • **Disable** = No Syslog. • **Network** = Syslog is sent to the Syslog server. (Recommended). • **Console** = Syslog is sent to the phone console. (You need to connect a serial cable to view the logs. This causes delays in phone operation). • **Both** = Syslog sends to the Syslog server AND the console. ▪ **Note:** It is recommended to leave this parameter

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Parameter	Description
	at its default value.
Server IP Address or Host Name **[system/syslog/server_address]**	The IP address (in dotted-decimal notation) of the computer you are using to run the Syslog server (e.g. Wireshark). The Syslog server is an application designed to collect the logs and error messages generated by the phone. The default IP address is 0.0.0.0. **Note:** This parameter is applicable when Activate is set to “Network” or “Both”.
Server Port **[system/syslog/server_port]**	Defines the UDP port of the Syslog server. The valid range is 0 to 65,535. The default port is 514. **Note:** This parameter is applicable when Activate is set to “Network” or “Both”.
Note: The following Severity level options are applicable for the fields below: • None • Emergency • Error • Waiting • Notice • Info • Debug	
VoIP Application	Defines multi-layer VoIP application.
SIP Call Control	Defines MTR layer Radvision.
SIP Stack	Defines SIP Stack Radvision.
Control Center	Responsible for Networking and running other processes.
LCD Display	Defines LCD Display.
CGI	Defines services for the Web server.
Web Server	Defines the phone Web server.
Watchdog	Responsible for keeping other processes running.
802.1X	Defines the security protocol.

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7.2 Monitoring: Pinging & Traceroute

This section shows how to perform pinging and traceroute using the Web interface.

Traceroute is a diagnostic you can use

- to display the route of packets across your network
- to measure transit delays.

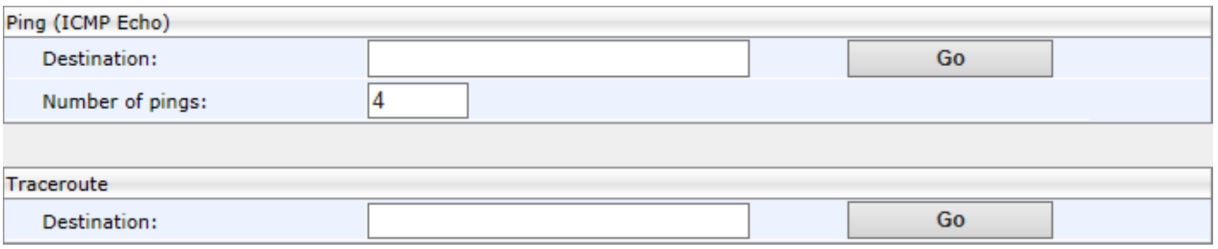
Traceroute computes the sum of the mean times it takes for the packets to transit each hop (from host to host) in the route.

Ping, by contrast, computes the final round-trip times from the destination point.

➢ To perform monitoring using the Web interface:

1. Open the Monitoring page (**Status & Diagnostics** tab > **Diagnostics** menu > **Monitoring**).

Figure 7-2: Web Interface - Monitoring



2. In the 'Destination' field, enter the IP of the device on the remote side to ping.
3. In the 'Number of pings' field, configure how many pings you want to send. You can configure multiple pings for (for example) constant communication tests.
4. Click the **Go** button to perform these diagnostics.

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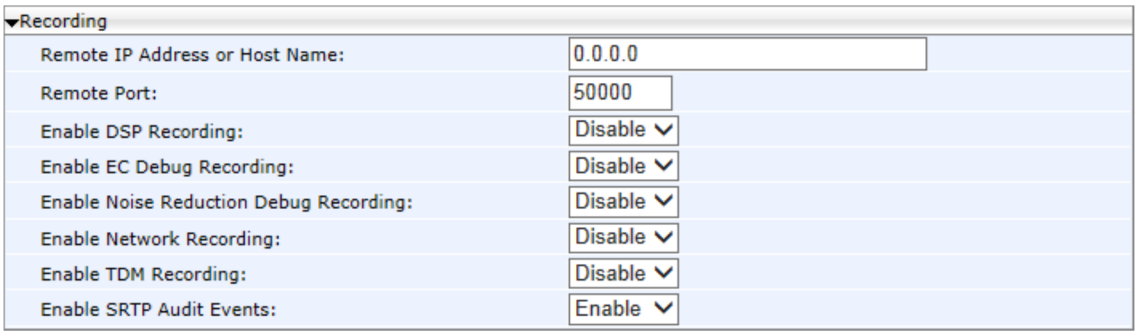
7.3 Enabling Recording to Debug Voice

This section shows how to use recording capability to debug voice activity on the phone. You can enable the capability using the Web interface or Configuration File.

➢ To enable recording to debug voice, using the Web interface:

1. Open the Recording page (**Status & Diagnostics** tab > **Diagnostics** menu > **Recording**).

Figure 7-3: Web Interface - Recording



2. Configure the parameters using the table below as reference and click **Submit**.

➢ To enable recording to debug voice, using the Configuration File:

- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and configure the parameters using the table below as reference.

Table 7-2: Packet Recording Parameters

Parameter	Description
Remote IP Address or Host Name **[voip/packet_recording/remote_ip]**	The IP address (in dotted-decimal notation) of the remote computer to which the recorded packets are sent. The recorded packets should be captured by a network sniffer (such as Wireshark). The default value is 0.0.0.0.
Remote Port **[voip/packet_recording/remote_port]**	Defines the UDP port of the remote computer to which the recorded packets are sent. The valid range is 1024 to 65535. The default value is 50000.
Enable DSP Recording **[voip/packet_recording/enabled]**	Activates the packet recording mechanism. ▪ **[0]** Disable (default) ▪ **[1]** Enable
Enable RTP Recording **[voip/packet_recording/rtp_recording/enabled]**	Only displayed in the Web interface if 'Enable DSP Recording' is enabled. Enables RTP recording. ▪ **[0]** Disable (default) ▪ **[1]** Enable

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Parameter	Description
Enable EC Debug Recording **[voip/packet_recording/ec_debug_recording/enabled]**	Activates the Echo Canceller Debug recording. ▪ **[0]** Disable (default) ▪ **[1]** Enable
Enable Noise Reduction Debug Recording **[voip/packet_recording/noise_reduction_recording/enabled]**	Traffic on the network stops when the MUTE key is activated. ▪ **[0]** Disable (default) ▪ **[1]** Enable
Enable Network Recording **[voip/packet_recording/network_recording/enabled]**	Activates the DSP network (TDM Out) recording. ▪ **[0]** Disable (default) ▪ **[1]** Enable
Enable TDM Recording **[voip/packet_recording/tdm_recording/enabled]**	Activates the DSP TDM (TDM In) recording. ▪ **[0]** Disable (default) ▪ **[1]** Enable

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7.4 Creating a Crash Dump File

This section shows how to create a crash dump file using the Web interface. Crash dump copies historical processes to a file. You can create the file at the time the problem occurs. You can use the file to debug the problem.

➢ To create a crash dump file using the Web interface:

1. Open the Crash Dump page (**Status & Diagnostics** tab > **Diagnostics** menu > **Crash Dump**).

Figure 7-4: Web Interface - Crash Dump

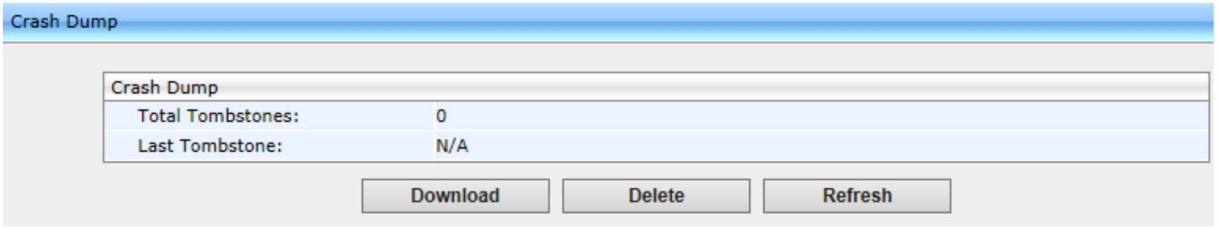

Table 7-3: Crash Dump Parameters

Parameter	Description
Total tombstones	The number of crashes on the phone.
Last tombstone	The date and time of the last crash (the exact time of the crash).

2. Click **Download** to save the crash dump file on your computer.

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7.5 Enabling Tracing

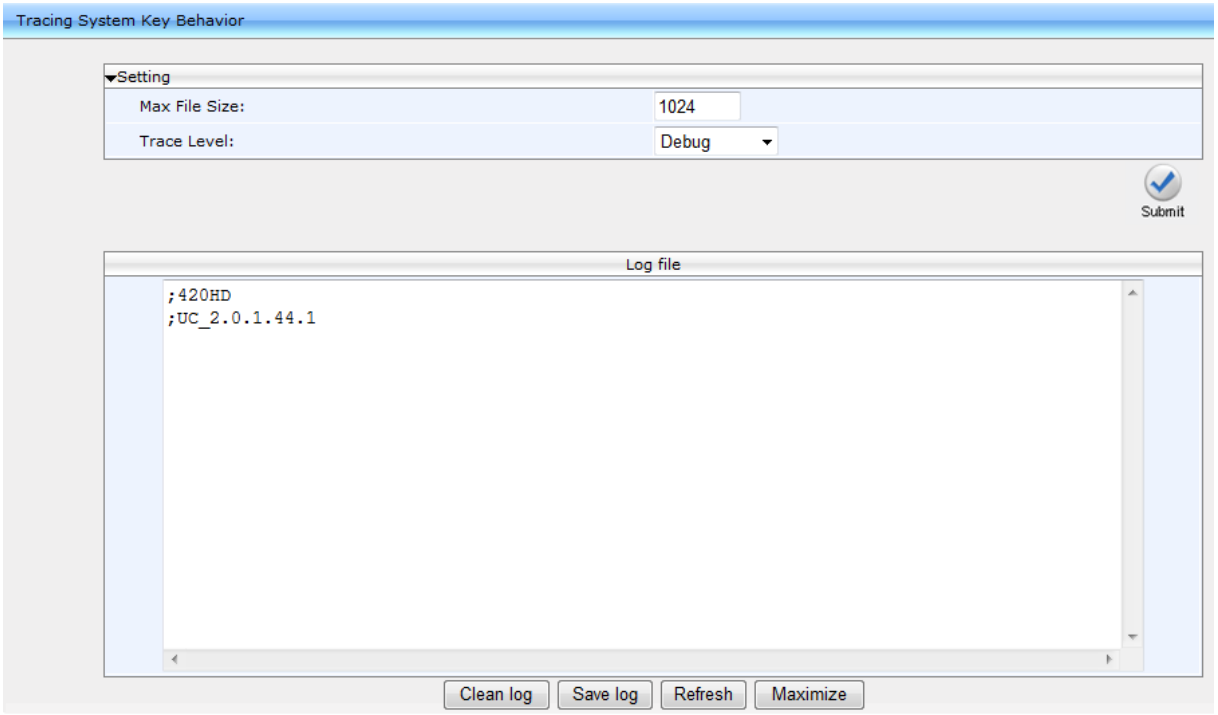
For effective troubleshooting and diagnosis it's recommended to set up the phone to store trace messages. See also Section 2.5.2 on page 25.

Note: During regular phone operation, it is recommended to *disable* debug tracing for improved performance.

➢ To enable tracing:

1. Log in to the Web management tool of the IP Phone, using HTTPS (e.g., https://172.17.0.103) through your Web browser. The phone's IP address can be obtained from the DHCP server, or from the phone's LCD screen (press MENU button > press 5 for **Status** menu > press OK button for **Network Status** menu > press OK button > press the Navigation key to scroll down until the IP address is displayed).
2. Open the Tracing page (**Status & Diagnostics** tab > **Diagnostics** menu > **Tracing**).
3. Set the 'Max File Size' field to **1024**.
4. Set the 'Trace Level' field to **Debug** to activate tracing to debug level.
5. Click **Submit**.
6. Click **Clean log**, and then power up the phone.
7. After the phone completes the power-up process, click **Save log**.
8. Send the saved logged trace to AudioCodes Customer Technical Support for troubleshooting.

Figure 7-5: Configuring Tracing



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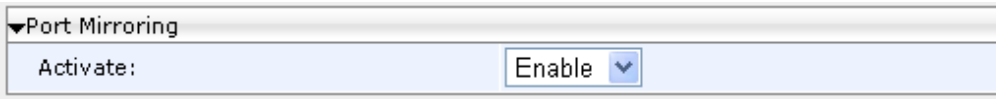
7.6 Configuring Port Mirroring

Port mirroring facilitates network traffic monitoring enabling administrators to analyze and debug data or diagnose errors on a network, manage network performance and be alerted to problems. Inbound or outbound traffic (or both) can be mirrored on single or multiple interfaces. Port mirroring can be activated using the Web interface or the Configuration File.

➢ To configure port mirroring using the Web interface:

1. Open the Recording page (**Configuration** tab > **Network Connections** menu > **Network Settings**).

Figure 7-6: Web Interface - Port Mirroring



2. Configure using the table below as reference and click **Submit**.

➢ To configure port mirroring using the Configuration File:

- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and configure the parameter using the table below as reference.

Table 7-4: Port Mirroring Parameters

Parameter	Description
Activate **[network/pc_port_mirroring/enabled]**	Enables port mirroring. ▪ **[0]** Disable (default) **-** The LAN/PC Network interfaces operate in SWITCH mode. ▪ **[1]** Enable **-** The LAN/PC Network interfaces operate in HUB mode. The network traffic on the LAN port is reflected in the PC port.

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8 Troubleshooting

This section provides various troubleshooting procedures.

8.1 Unable to Sign in to Lync using Username/Password

Problem	Unable to sign in to Lync using the username/password sign-in method.
LCD Message	"Invalid address, username or password"

Corrective Actions

1. Ensure that you have correctly entered the sign-in address, username, and password.
2. Ensure that you have the correct username/password; it may have changed in the Enterprise's Active Directory.
3. Ensure that you are in the correct sign-in method (press the **Sign-in** softkey, scroll down to **Switch sign-in method**, and then press the OK key or **Select** softkey).

8.2 Unable to Authenticate User using PIN

Problem	Unable to authenticate user when signing in to Lync using PIN code.
LCD Message	"The phone number or extension is not valid"

Corrective Actions

1. Ensure that you have entered the phone number / PIN code correctly.
2. Ensure that you have the correct PIN code; it may have changed in the Enterprise's Active Directory.
3. Ensure that you are in the PIN code sign-in method (press the **Sign-in** softkey, scroll down to **Switch sign-in method**, and then press the OK key or **Select** softkey).

8.3 IP Phone Fails Registration Process

Problem	The phone fails to register.
LCD Message	-

Corrective Actions

Make sure that:

1. DHCP Option 43 has been configured.
2. Access is possible from the following Web site:
   https://YOUR_AUTHORITY_SERVER:443/CertProv/CertProvisioningService.svc
3. If the environment supports more than one CA Certificate, this must be included in the CA Certificate file and loaded to the IP phone.

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8.4 How to Verify CA Certificate is Trusted / Authorized by IP Phone

Problem	How do I know if my CA Certificate is trusted and authorized by the IP Phone?
LCD Message	-
Corrective Actions	
Verify whether your public trusted certificate is listed in Microsoft Public Trusted Certificates (http://technet.microsoft.com/en-us/library/gg398270(v=ocs.14).aspx).	

8.5 Invalid Time Server

Problem	The time server is invalid.
LCD Message	-
Corrective Actions	
Ensure that NTP (DHCP Option 42) is configured in the DHCP server and is defined as NTP SRV records. If not, manually configure it.	

8.6 Invalid Time Offset

Problem	The time offset is incorrect.
LCD Message	-
Corrective Actions	
Ensure that the Time Offset (DHCP Option 2) is configured in the DHCP server. If not, manually configure Daylight Saving Time (DST) values in the 420HD IP Phone.	

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8.7 General Corrective Actions

8.7.1 Restoring Phone Defaults

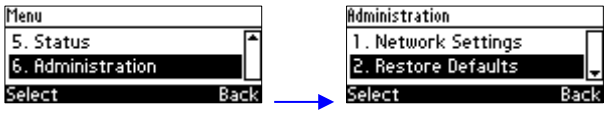
The phone's default settings can be restored from the phone's LCD or from the Web interface.

8.7.1.1 Restoring Factory Defaults from the Phone LCD

This section shows how to restore factory defaults from the phone's LCD.

➢ **To restore the phone's default settings from the LCD:**

1. Open the **Restore Defaults** menu option (**MENU** key > **Administration** > **Restore Defaults**):



2. Press the **Select** softkey:

3. Press the **Yes** softkey to confirm or **No** to cancel.

Note: You can restore the phone's settings to their defaults without needing access to the 'Administration' menu or (2) administrator access to the Web interface.

To restore the phone's settings to their defaults if necessary:

1. Press the **OK** + **MENU** keys simultaneously and keeping them pressed, unplug the power cable.
2. Plug the power cable back into the phone continuing to press the **OK** + **MENU** keys for +-5 seconds.
3. Release the **OK** + **MENU** keys; the phone' settings are restored to their defaults.

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8.7.1.2 Restoring Factory Defaults from the Web Interface

This section shows how to restore the phone's factory defaults from the Web interface.

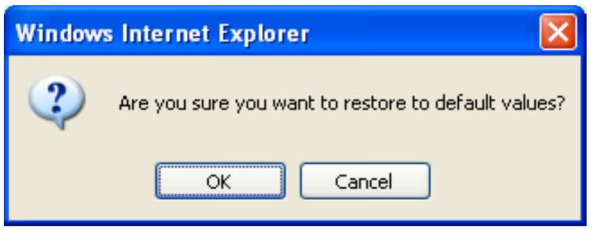
➢ **To restore the phone's factory defaults from the Web interface:**

1. Open the Restore Defaults page (**Management** tab > **Administration** > **Restore Defaults**).

Figure 8-1: Web Interface - Restore Defaults

2. Click the **Submit** button:

Figure 8-2: Confirm Restore to Factory Defaults



3. Click **OK**.

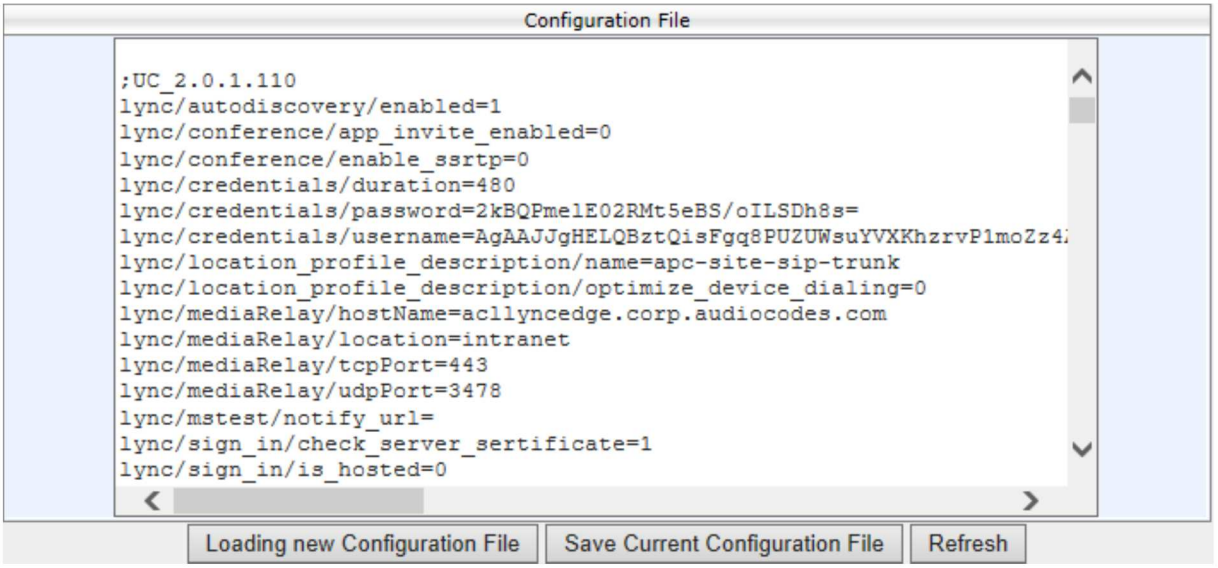
8.7.2 Loading the Configuration File Manually

This section shows how to load the cfg configuration file to the phone.

➢ **To load the cfg configuration file to the phone:**

1. In the Web interface, open the Configuration File page (**Management** tab > **Manual Update** menu > **Configuration File**):

Figure 8-3: Web Interface - Configuration File



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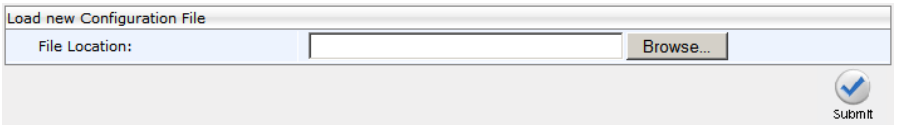
The configuration you created is displayed in the text pane.

2. Click the **Loading new Configuration File** button:

Figure 8-4: Web Interface - Load New Configuration File



3. Click **Browse** and select the cfg file you created; the phone verifies that it's related to the phone model. The cfg is then loaded to the phone. Once loaded, the phone reboots (indicated on the LCD). The phone is now loaded with the cfg configuration file you created.

8.7.3 Recovering Firmware

If the phone is powered off for some reason during the firmware upgrade process, the phone becomes unusable.

➢ **To recover the phone firmware:**

1. Ensure that your DHCP server supports Options 66 (TFTP server address) and 67 (firmware file), and that these are configurable.
2. Before connecting the phone, verify that the TFTP server is running and the firmware file for recovery is located in the correct location.
3. Connect your phone to the IP network and then connect the phone to the power outlet;
   a. The phone sends a TFTP request to the IP address indicated in the DHCP Option 66 field to retrieve the firmware file indicated in the DHCP Option 67 field.
   b. The phone, in the DHCP Discover message sends its model name in the DHCP Option 77 field. The DHCP server, according to the phone model, sets the appropriate firmware file name in the DHCP Option 67 field sent to the phone (e.g., 420HD_2.0.9.img).
   c. The phone then upgrades to the recovery firmware.
   d. After the firmware upgrade process completes, the phone boots up successfully.

8.7.4 Restarting the Phone

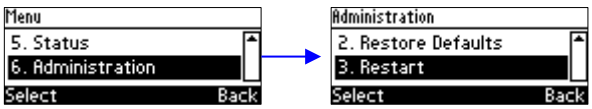
The IP Phone can be restarted from phone's LCD or the Web interface.

8.7.4.1 Restarting the Phone from the LCD

This section shows how to restart the phone from its LCD.

➢ **To restart the phone from its LCD:**

1. Select the **Restart** submenu (**MENU** key > **Administration** > **Restart**):



A warning message appears requesting you to confirm:

2. Press the **Yes** softkey to confirm phone restart or **No** to cancel.

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8.7.4.2 Restarting the Phone from the Web Interface

This section shows how to restart the phone from the Web interface:

➢ **To restart the phone from the Web interface:**

1. Open the Restart System page (**Management** tab > **Administration** menu > **Restart System**).

Figure 8-5: Web Interface - Restart System

2. Click the **Restart** button:

Figure 8-6: Confirmation Box

3. Click **OK**.

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A Alternative Automatic Provisioning Methods

A.1 Static DNS Record Method

The Static DNS (Generic Domain Name) Record method is used for automatic provisioning when you are unable to manage your DHCP server. If the provisioning server does not support using SIP SUBSCRIBE and NOTIFY messages mechanism as described above and no response for the SIP SUBSCRIBE message has been received, the phone tries to retrieve firmware and configuration files using the following URL:
tftp://ProvisioningServer/<*Phone Model Name*>/

For example:

- The phone tries to obtain the following firmware file:
  tftp://ProvisioningServer/420HD/420HD.img
- The phone tries to obtain the following configuration file:
  tftp://ProvisioningServer/420HD/<MAC address>.cfg
  (e.g. tftp://ProvisioningServer/420HD/001122334455.cfg)

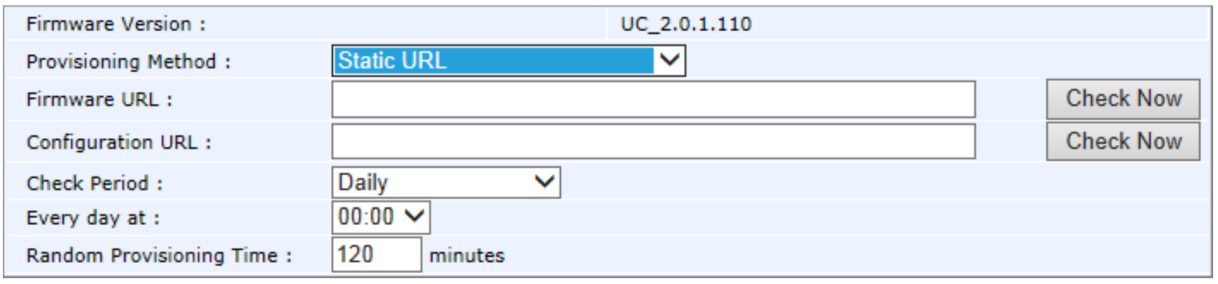
It is the Administrator's responsibility to configure a DNS entry called **ProvisioningServer** on the DNS server and set it to the TFTP server IP address.

Note: If Generic Domain Name is used, the automatic provisioning mechanism periodically tries to retrieve new firmware/configuration from Provisioning Server domain name.

➢ To configure Static DNS Record using the Web interface:

1. Open the Automatic Update page (**Management** tab > **Automatic Update** menu > **Automatic Provisioning**).

Figure A-1: Web Interface - Static DNS Record



2. Configure using the table below as reference and click **Submit**.

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➢ To configure Static DNS Record using the Configuration File:

- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and configure the parameters using the table below as reference.

Table A-1: Static DNS Record Parameters

Parameter	Description
Firmware URL **[provisioning/firmware/url]**	The static URL for checking the firmware file. The URL must be entered using one of the following syntax options: ▪ <protocol>://<server IP address or host name> ▪ <protocol>://<server IP address or host name>/<firmware file name> Where <protocol> can be one of the following protocols: "ftp", "tftp", "http" or "https". For example: ▪ tftp://192.168.2.1 – retrieved firmware file is 420HD.img ▪ ftp://192.168.2.1/Different_Firmware_Name.img - retrieved firmware file is Different_Firmware_Name.img **Note:** This parameter is applicable only when **method** is configured to "Static".
Configuration URL **[provisioning/configuration/url]**	The static URL for checking the configuration file. The URL must be entered using one of the following syntax options: ▪ <protocol>://<server IP address or host name> ▪ <protocol>://<server IP address or host name>/<configuration file name> Where <protocol> can be "ftp", "tftp", "http" or "https" and where <configuration file name> can be either: ▪ A unique configuration file, per phone, for example: <MAC>.cfg -or- ▪ A global configuration file, per deployment, for example, 420HD.cfg Unique Configuration Example **http://192.168.2.1/different.img;<MAC>.cfg** The retrieved firmware file is *different.img* and the configuration file name is *<MAC>.cfg* such as *001122334455.cfg* Global Configuration Example **http://192.168.2.1/<420HD>.cfg** The configuration file name is *420HD.cfg* **Note:** This parameter is applicable only when 'Method' is configured to **Static**.

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A.2 SIP SUBSCRIBE and NOTIFY Methods

If the provisioning information (e.g. Option fields 66/67/160) is not provided by the DHCP server, the phone sends a SIP SUBSCRIBE message to the multicast address **224.0.1.75:5060** as shown below.

Note: If the provisioning server supports using SIP SUBSCRIBE and NOTIFY messages and the device receives the provisioning URL in the NOTIFY message, the automatic provisioning mechanism then periodically tries to retrieve a new firmware/configuration according to the information provided.

```
SUBSCRIBE sip:224.0.1.75:5060 SIP/2.0
From: <sip:00000001@10.13.2.37:5060>;tag=87a5a8-25020d0a-13c4-
50029-386d4398-66dc40c-386d4398
To: <sip:224.0.1.75:5060>
Call-ID: 8884c8-25020d0a-13c4-50029-386d4398-3e2bcb8e-386d4398
CSeq: 1 SUBSCRIBE
Via: SIP/2.0/UDP 10.13.2.37:5060;rport;branch=z9hG4bK-386d4398-
6ad00ca2-7ca3606e
Expires: 0
Event: ua-profile;profile-
type="application";model="420HD";version="2.0.9"
Max-Forwards: 70
Supported: replaces,100rel
Accept:  application/url
Contact: <sip:00000001@10.13.2.37:5060>
User-Agent: AUDC-IPPhone/1.2.1_build_6
Content-Length: 0
```

The provisioning server or any other entity replies with a 200 OK message to the SUBSCRIBE message (see below) and sends a NOTIFY SIP message with the provisioning URL in the message body as shown below.

If no response is received by the provisioning server, the phone resends SUBSCRIBE messages for five seconds.

With the above method, the phone uses its built-in auto-provisioning mechanism while the provisioning information is retrieved through the NOTIFY message.

The following code describes **SIP 200 OK Response on the SUBSCRIBE Message**:

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP 10.13.2.37:5060;rport;branch=z9hG4bK-386d4398-
6ad00ca2-7ca3606e
Contact: <sip:10.13.2.37:5060>
To: <sip:224.0.1.75:5060>
From: <sip:00000001@10.13.2.37:5060>;tag=87a5a8-25020d0a-13c4-
50029-386d4398-66dc40c-386d4398
Call-ID: 8884c8-25020d0a-13c4-50029-386d4398-3e2bcb8e-386d4398
CSeq: 1 SUBSCRIBE
Expires: 0
Content-Length: 0
```


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The following code describes **SIP NOTIFY Message with Provisioning Information**.

```
NOTIFY sip:10.13.2.37:5060 SIP/2.0
Via: SIP/2.0/UDP 10.13.2.37:5060;rport;branch=z9hG4bK-386d4398-
6ad00ca2-7ca3606e
Max-Forwards: 20
Contact: <sip:10.13.4.121:5060>
To: <sip:224.0.1.75:5060>
From: <sip:00000001@10.13.2.37:5060>;tag=87a5a8-25020d0a-13c4-
50029-386d4398-66dc40c-386d4398
Call-ID: 8884c8-25020d0a-13c4-50029-386d4398-3e2bcb8e-386d4398
CSeq: 1 NOTIFY
Content-Type: application/url
Subscription-State: terminated;reason=timeout
Event: ua-profile;profile-
type="application";model="420HD";version="2.0.9"
Content-Length: 18
tftp://10.13.4.121
```

The following code describes **SIP SUBSCRIBE Message to Obtain Provisioning Information.**

```
SUBSCRIBE sip:224.0.1.75:5060 SIP/2.0
From: <sip:00000001@10.13.2.37:5060>;tag=87a5a8-25020d0a-13c4-
50029-386d4398-66dc40c-386d4398
To: <sip:224.0.1.75:5060>
Call-ID: 8884c8-25020d0a-13c4-50029-386d4398-3e2bcb8e-386d4398
CSeq: 1 SUBSCRIBE
Via: SIP/2.0/UDP 10.13.2.37:5060;rport;branch=z9hG4bK-386d4398-
6ad00ca2-7ca3606e
Expires: 0
Event: ua-profile;profile-
type="application";model="420HD";version="2.0.9"
Max-Forwards: 70
Supported: replaces,100rel
Accept:  application/url
Contact: <sip:00000001@10.13.2.37:5060>
User-Agent: AUDC-IPPhone/1.2.1_build_6
Content-Length: 0
```

The provisioning server or any other entity replies with a 200 OK message to the SUBSCRIBE message (see below) and sends a NOTIFY SIP message with the provisioning URL in the message body as shown below.

If no response is received by the provisioning server, the phone resends SUBSCRIBE messages for 5 seconds.

With the above method, the phone uses its built-in auto-provisioning mechanism while the provisioning information is retrieved through the NOTIFY message.

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The following code describes **SIP 200 OK Response on the SUBSCRIBE Message.**

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP 10.13.2.37:5060;rport;branch=z9hG4bK-386d4398-
6ad00ca2-7ca3606e
Contact: <sip:10.13.2.37:5060>
To: <sip:224.0.1.75:5060>
From: <sip:00000001@10.13.2.37:5060>;tag=87a5a8-25020d0a-13c4-
50029-386d4398-66dc40c-386d4398
Call-ID: 8884c8-25020d0a-13c4-50029-386d4398-3e2bcb8e-386d4398
CSeq: 1 SUBSCRIBE
Expires: 0
Content-Length: 0
```

The following code describes **SIP NOTIFY Message with Provisioning Information.**

```
NOTIFY sip:10.13.2.37:5060 SIP/2.0
Via: SIP/2.0/UDP 10.13.2.37:5060;rport;branch=z9hG4bK-386d4398-
6ad00ca2-7ca3606e
Max-Forwards: 20
Contact: <sip:10.13.4.121:5060>
To: <sip:224.0.1.75:5060>
From: <sip:00000001@10.13.2.37:5060>;tag=87a5a8-25020d0a-13c4-
50029-386d4398-66dc40c-386d4398
Call-ID: 8884c8-25020d0a-13c4-50029-386d4398-3e2bcb8e-386d4398
CSeq: 1 NOTIFY
Content-Type: application/url
Subscription-State: terminated;reason=timeout
Event: ua-profile;profile-
type="application";model="420HD";version="2.0.9"
Content-Length: 18
tftp://10.13.4.121
```


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B Specifications

This section details the 400HD Series IP Phones specifications.

B.1 420HD IP Phone

The table below details the 420HD IP Phone specifications.

Table B-1: 420HD IP Phone Specifications

Feature	Details
VoIP Signaling Protocols	▪ SIP: RFC 3261, RFC 2327 (SDP)
Data Protocols	▪ IPv4, TCP, UDP, ICMP, ARP, DNS and DNS SRV for SIP Signaling ▪ SIP over TLS (SIPS) ▪ 802.1x ▪ 802.1p/Q for Traffic Priority and QoS ▪ VLAN Discovery Mechanism (CDP, LLDP and LLDP-MED) ▪ ToS (Type of Service) field, indicating desired QoS DHCP Client ▪ NTP Client ▪ Microsoft Lync ▪ MS-ICE2
Media Processing	▪ Voice Coders: G.711, G.729A/B, G.722, and RTA ▪ Acoustic Echo Cancelation: G.168-2004 compliant, 64-msec tail length ▪ Adaptive Jitter Buffer 300 msec ▪ Voice Activity Detection ▪ Comfort Noise Generation ▪ Packet Lost Concealment ▪ RTP/RTCP Packetization (RFC 3550, RFC 3551), SRTP (RFC 3711) ▪ DTMF Relay (RFC 2833)
Telephony Features	▪ Call Hold / Un-Hold ▪ Call Transfer ▪ 3-Way Conferencing (with local mixing) ▪ Redial ▪ Caller ID Notification ▪ Call Waiting Indication ▪ Message Waiting Indication (including MWI LED) ▪ Local and Corporate Directories ▪ Automatic On-hook Dialing ▪ Automatic Answering (Alert-Info header and "talk" event) ▪ CWRR (Call Waiting Reminder Ring) ▪ Call Logs: Missed/Received Calls and Dialed Numbers ▪ URL Dialing ▪ 1-9 Speed Dials (dial pad keys) ▪ Call Forward (Do not forward, Forward to voice mail, Forward to a number) ▪ Dial plan (supports normalization rules downloaded from the Lync server via in-band provisioning) ▪ Inputting Text to Dial (T9)

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Feature	Details
Configuration/ Management	▪ LCD Display User Interface Language Support (Various Languages) ▪ Web-based Management (HTTP/HTTPS) ▪ Auto-Provisioning (via TFTP, FTP, HTTP and HTTPS) for firmware and configuration file upgrade ▪ In-Band Provisioning ▪ DHCP options (66, 67, and 160) for auto-provisioning ▪ DHCP options (120, 60, and 77) for device information ▪ DHCP option (42 or 4) for the NTP server ▪ DHCP option (43) for the URL of the Certificate Provisioning service ▪ DHCP option (2) for the Time Zone Offset ▪ Lync Contacts ▪ LDAP (Lightweight Directory Access Protocol) ▪ Private labeling mechanism ▪ Configuration file encryption (entire file and individual parameters)
Debugging Tools	▪ IPP Tracing ▪ Syslog mechanism ▪ DSP recording ▪ Port mirroring ▪ VoIP Status Web page
Hardware	▪ **LCD screen:** Graphic LCD (128 X 48) ▪ Connectors interfaces: ✓ 2 x RJ-45 ports (10/100BaseT Ethernet) for WAN and LAN ✓ RJ-9 port (jack) for Headset ✓ RJ-9 port (jack) for Handset ▪ Mounting: ✓ Wall and desktop mounting options ✓ One angle for desktop mount, another angle for wall mount ▪ Power: ✓ DC jack adapter 12V ✓ Power supply AC 100 ~ 240V ✓ PoE Class 1: IEEE802.3af (optional) ▪ Keys: ✓ 4 x softkeys ✓ VOICE MAIL message hotkey ✓ 4-way navigation keys with ENTER Key ✓ MENU ✓ REDIAL ✓ HOLD ✓ MUTE ✓ TRANSFER ✓ VOLUME control key ✓ HEADSET ✓ SPEAKER
Headset Compatibility	▪ For a comprehensive list of supported Jabra headsets, see the Jabra Headset Compatibility Guide ▪ For a comprehensive list of supported Plantronics headsets headsets see http://www.plantronics.com/us/compatibility-guide/#/search/

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B.2 430HD and 440HD IP Phones

The table below details the 430HD and 440HD IP Phones specifications.

Table B-2: 430HD and 440HD IP Phone Specifications

Feature	Details
VoIP Signaling Protocols	▪ SIP: RFC 3261, RFC 2327 (SDP)
Data Protocols	▪ IPv4, TCP, UDP, ICMP, ARP, DNS and DNS SRV for SIP Signaling ▪ SIP over TLS (SIPS) ▪ 802.1x ▪ 802.1p/Q for Traffic Priority and QoS ▪ VLAN Discovery Mechanism (CDP, LLDP and LLDP-MED) ▪ ToS (Type of Service) field, indicating desired QoS DHCP Client ▪ NTP Client ▪ Microsoft Lync ▪ MS-ICE2
Media Processing	▪ Voice Coders: G.711, G.729A/B, G.722, and RTA. ▪ Acoustic Echo Cancelation: G.168-2004 compliant, 64-msec tail length ▪ Adaptive Jitter Buffer 300 msec ▪ Voice Activity Detection ▪ Comfort Noise Generation ▪ Packet Lost Concealment ▪ RTP/RTCP Packetization (RFC 3550, RFC 3551), SRTP (RFC 3711) ▪ DTMF Relay (RFC 2833)
Telephony Features	▪ Call Hold / Un-Hold ▪ Call Transfer ▪ 3-Way Conferencing (with local mixing) ▪ Redial ▪ Caller ID Notification ▪ Call Waiting Indication ▪ Message Waiting Indication (including MWI LED) ▪ Local and Corporate Directories ▪ Automatic On-hook Dialing ▪ Automatic Answering (Alert-Info header and "talk" event) ▪ CWRR (Call Waiting Reminder Ring) ▪ Call Logs: Missed/Received Calls and Dialed Numbers ▪ 5 Programmable Keys, each configurable as a Speed Dial or as Key Event (Missed Calls, Received Calls, Dialed Calls, Directory, DnD All, Forward All) ▪ 12 Function Keys, each configurable as a Speed Dial, with presence monitoring ▪ URL Dialing ▪ Call Forward (Do not forward, Forward to voice mail, Forward to a number) ▪ Boss Admin (applies only to the 430HD and 440HD phones) ▪ Dial plan (supports normalization rules downloaded from the Lync server via in-band provisioning) ▪ T9 predictive text for Corporate Directory search

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Feature	Details
Configuration/ Management	▪ LCD Display User Interface Language Support (Various Languages) ▪ Web-based Management (HTTP/HTTPS) ▪ Auto-Provisioning (via TFTP, FTP, HTTP, and HTTPS) for firmware and configuration file upgrade ▪ In-band Provisioning ▪ DHCP options (66, 67, and 160) for auto-provisioning ▪ DHCP options (120, 60, and 77) for device information ▪ DHCP option (42 or 4) for the NTP server ▪ DHCP option (43) for the URL of the Certificate Provisioning service ▪ DHCP option (2) for the Time Zone Offset ▪ Lync Contacts ▪ LDAP (Lightweight Directory Access Protocol) ▪ Private labeling mechanism ▪ Configuration file encryption (entire file and individual parameters)
Debugging Tools	▪ IPP Tracing ▪ Syslog mechanism ▪ DSP recording ▪ Port mirroring ▪ VoIP Status Web page
Hardware	▪ **LCD screen:** Graphic LCD (132x64) monochrome ▪ **BLF screen:** Graphic LCD (60x376) monochrome (applies only to the 440HD model) ▪ Connectors interfaces: ✓ 2 x RJ-45 ports (10/100/1000BaseT Ethernet) for WAN and LAN ✓ RJ-9 port (jack) for Headset ✓ RJ-9 port (jack) for Handset ✓ USB interface for USB headset support ✓ RJ-11 interface for DHSG ▪ Mounting: ✓ Wall and desktop mounting options ✓ One angle for desktop mount, another angle for wall mount ▪ Power: ✓ DC jack adapter 12V ✓ Power supply AC 100 ~ 240V ✓ PoE Class 2: IEEE802.3af (optional) ▪ Keys: ✓ 4 x softkeys ✓ VOICE MAIL message hotkey (including LED) ✓ 4-way navigation keys with ENTER Key ✓ MENU ✓ REDIAL ✓ HOLD ✓ MUTE (including LED) ✓ TRANSFER ✓ VOLUME control key ✓ HEADSET (including LED) ✓ SPEAKER (including LED)

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Feature	Details
Headset Compatibility	▪ For a comprehensive list of supported Jabra headsets, see the Jabra Headset Compatibility Guide ▪ For a comprehensive list of supported Plantronics headsets headsets see http://www.plantronics.com/us/compatibility-guide/#/search/ ▪ For a comprehensive list of supported VXi products, see http://www.vxicorp.com/compatibility_guide/

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B.3 SIP Support (RFC, Headers)

The following is a list of supported SIP RFCs and methods that you can use to create for the phone.

Table B-3: Supported IETF RFCs

RFC Number	RFC Title
RFC 2327	SDP
RFC 2617	HTTP Authentication: Basic and Digest Access Authentication
RFC 2782	A DNS RR for specifying the location of services
RFC 2833	Telephone event
RFC 3261	SIP
RFC 3262	Reliability of Provisional Responses in SIP
RFC 3263	Locating SIP Servers
RFC 3264	Offer/Answer Model
RFC 3265	(SIP)-Specific Event Notification
RFC 3310	Hypertext Transfer Protocol (HTTP) Digest Authentication Using Authentication and Key Agreement (AKA)
RFC 3311 (Partially Supported)	UPDATE Method
RFC 3326 (Partially Supported)	Reason header
RFC 3389	RTP Payload for Comfort Noise
RFC 3515	Refer Method
RFC 3605	RTCP attribute in SDP
RFC 3611	RTP Control Protocol Extended Reports (RTCP XR)
RFC 3665	SIP Basic Call Flow Examples
RFC 3711	The Secure Real-time Transport Protocol (SRTP)
RFC 3725	Third Party Call Control
RFC 3842	MWI
RFC 3891	"Replaces" Header
RFC 3892 (Sections 2.1-2.3 and 3 are supported)	The SIP Referred-By Mechanism
RFC 3960 (Partially Supported)	Early Media and Ringing Tone Generation in SIP (partial compliance)
RFC 3966	The tel URI for Telephone Numbers
RFC 4028 (Partially Supported)	Session Timers in the Session Initiation Protocol
RFC 4240	Basic Network Media Services with SIP - NetAnn
draft-ietf-sip-privacy-04.txt (Partially Supported)	SIP Extensions for Network-Asserted Caller Identity using Remote-Party-ID header

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RFC Number	RFC Title
draft-ietf-sipping-cc-transfer-05	Call Transfer
draft-ietf-sipping-realtimefax-01	SIP Support for Real-time Fax: Call Flow Examples
draft-choudhuri-sip-info-digit-00	SIP INFO method for DTMF digit transport and collection
draft-mahy-sipping-signaled-digits-01	Signaled Telephony Events in the Session Initiation Protocol

Note: The following SIP features are not supported:

- Preconditions (RFC 3312)
- SDP - Simple Capability Declaration (RFC 3407)
- S/MIME
- Outbound, Managing Client-Initiated Connections (RFC 5626)
- SNMP SIP MIB (RFC 4780)
- SIP Compression – RFC 5049 (SigComp)
- ICE (RFC 5245)
- Connected Identity (RFC 4474)

B.3.1 SIP Compliance Tables

The SIP device complies with RFC 3261 as shown in the following subsections.

B.3.1.1 SIP Methods

The device supports the following SIP methods:

Table B-4: Supported SIP Methods

Method	Supported	Comments
INVITE	Yes	
ACK	Yes	
BYE	Yes	
CANCEL	Yes	
REGISTER	Yes	Send only
REFER	Yes	Inside and outside of a dialog
NOTIFY	Yes	
INFO	Yes	
OPTIONS	Yes	
PRACK	Yes	
PUBLISH	Yes	Send only
SUBSCRIBE	Yes	

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B.3.1.2 SIP Headers

The device supports the following SIP headers:

Table B-5: Supported SIP Headers

Header Field	Supported
Accept	Yes
Alert-Info	Yes
Allow	Yes
Authorization	Yes
Call-ID	Yes
Call-Info	Yes
Contact	Yes
Content-Length	Yes
Content-Type	Yes
Cseq	Yes
Date	Yes
Diversion	Yes
Encryption	No
Expires	Yes
Fax	Yes
From	Yes
History-Info	Yes
Join	Yes
Max-Forwards	Yes
MIN-SE	Yes
P-Asserted-Identity	Yes
P-Preferred-Identity	Yes
Proxy- Authenticate	Yes
Proxy- Authorization	Yes
Prack	Yes
Record- Route	Yes
Refer-To	Yes
Referred-By	Yes
Replaces	Yes
Remote-Party-ID	Yes
Retry-After	Yes
Route	Yes

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Header Field	Supported
Session-Expires	Yes
Supported	Yes
Timestamp	Yes
To	Yes
Unsupported	Yes
User- Agent	Yes
Via	Yes
Voicemail	Yes
Warning	Yes
WWW- Authenticate	Yes

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HD VoIP

Administrator's Manual

400HD Series IP Phones with Microsoft® Lync™

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